COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices © 1977 by Computerworld, Inc
/year March 21, 1977 Vol. XI, No. 12

NEWSPAPER

Actual Cost of Privacy Act Much Less Than Expected, OMB Reports to Congress

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The costs of implementing the Privacy Act of 1974 are "substantially less" than originally estimated by the Office of Management and Budget (OMB), according to a survey of federal agencies conducted by OMB last summer and published here recently

As predicted, granting individuals access to their records represented the single largest operating cost, OMB said. Access cost taxpayers $10.7 million, or 29.2% of the funds agencies had allotted for implementing the Privacy Act.

The start-up costs connected with fair recordkeeping practices for 85 of the 88 agencies surveyed were $29.5 million between Jan. 1, 1976 and Sept. 30, 1976. Overall Privacy Act operating costs for these agencies between Sept. 27, 1975 and Sept. 30, 1976 were estimated to be $36.6 million, according to OMB's report to Congress.

These figures were considerably below OMB's 1974 estimates, which indicated the cost of implementing the House version of the Privacy Act would be on the order of $200 million to $300 million annually over the next four to five years, with an additional one time start-up cost of $100 million expended within the first two years.

At the time OMB made its estimates, it warned Congress of the extreme difficulty of reliably estimating the cost of privacy legislation without any experience operating under it. In its report, the Executive Office of the President again urged caution in taking these figures as gospel.

Largest Single Component

In analyzing the agency responses, OMB found compliance with the Privacy Act's publication requirements was "by far the largest single component of start-up costs," accounting for $13.5 million, or 46%, of the total $29.5 million.

"This represents an average of $2,000 per system," the report said.

The cost of developing and publishing rules, which is not necessarily a function of the number of systems an agency has, was also included in this figure, OMB stated. On a continuing basis, the budget agency estimated, the effort involved in preparing rules and notices of record systems will cost $4.4 million, or 12%, of Privacy Act operating costs.

(Continued on Page 4)

DEC PDP-11/60 features integral floating-point instruction set.

DEC Extends Cache Memory Use With Introduction of PDP-11/60

By Esther Surden
Of the CW Staff

MAYNARD, Mass. — Digital Equipment Corp.'s PDP-11/60 introduced last week brings cache memory — formerly the realm of the firm's PDP-11/70 supermini — to a DEC general-purpose, mid-range minicomputer.

The PDP-11/60 also features an integral floating-point instruction set said to allow the system to speed the execution of DEC's Fortran-IV-Plus language. Without this feature, the system would take three times longer to execute the Fortran instructions, according to a spokesman.

Designed for laboratory, industrial and educational use, the PDP-11/60 falls into the performance range of the firm's PDP-11/45 but costs about 25% less, he said, adding DEC will continue to sell the PDP-11/45.

The PDP-11/60 is available in both end-user and OEM versions. The end-user version is an integrated system configuration including 256K bytes of memory, two disk drives with a total capacity of 28M bytes and an LA 36 hard-copy terminal. The CPU and memory are available separately to OEMs, the company said.

Present PDP-11 end users cannot upgrade to the 11/60 processor without replacing their entire systems, the spokesman explained, because the unit is supplied to end users integrated "on a cabinet level."

The PDP-11/60 CPU is microprogrammable. Using cache memory, it features a 532 nsec "effective" cycle time, DEC said. Cache memory for the 11/60 is the same 2K-byte size as the cache on the firm's 11/-

(Continued on Page 4)

User Urges Nonregulated Unit of AT&T

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — AT&T should provide data communications equipment on a nonregulated basis, according to one of the country's largest telecommunications users.

Under current law, the Bell System is limited to offering only tariffed, regulated devices.

AT&T should be required to establish a fully autonomous, nonregulated organization to develop, market and maintain terminals, modems and similar equipment, according to Robert Bennis, director of telecommunications at Westinghouse Electric Corp.

Presenting this user viewpoint at a DataComm 77 "town meeting" session here recently, Bennis said it is not practical to draft a regulation that ensures against abuse and, at the same time, encourages technological innovation and avoids regulatory paralysis "brought about by interpretive arguments.

"The user, the supplier and the common carriers have already paid dearly for our inability to recognize this fact. In the process of trying to protect, acquire or increase our share of the action, we have incurred increasing expense, compromised our systems and made a shambles of our planning process," Bennis told the session attendees.

FCC Should Favor User

The Federal Communications Commission (FCC) should act to protect the user public and should favor "the broad user interests over those of any particular supplier or supplier group. The user public's interest demands universal availability of terminal and incidental communications equipment whether supplied by common carriers or others," he said.

The post-Carterfone environment, in which alternative sources of equipment have become available, is "most advantageous to users," he added.

The commission should recognize that "computers are an indispensible tool of communications as well as data processing. The carriers must be free to utilize technologically innovative equipment that is fully adequate to meet the communications needs of users," he said.

CW Photo by R. Frank
Walter Hinchman

There is ample opportunity for the FCC, Congress or the courts to prohibit common carriers from participating in the business of DP without limiting their innovative opportunities to provide new communications services, Bennis continued.

Any prohibitions which are required should "be framed in terms of the purpose and effect of the services provided and not in terms of the processes or equipment utilized," he said.

Referring to the proposed definitions put forth by the FCC in the reopened Computer Inquiry, Bennis said the "present and proposed regulations use a technological segregation method to prohibit common carriers from using certain processes or certain kinds of equipment."

Users don't object to a prohibition against common carriers participating in the business of DP. But the commission must as-

(Continued on Page 6)

Fla. to Refund Software Taxes; Other States Deciding Positions

By Molly Upton
Of the CW Staff

The Florida Department of Revenue has announced it will consider refunding taxes on the sale of software that were collected before they were ruled illegal in a recent administrative hearing.

But Florida isn't the only state where tax officials are attempting to tax software or services and where users and vendors are moving to strike or at least clarify the laws being used to justify taxing the sale of software.

Actions have been reported in Alabama, Wisconsin, New York, New Jersey and California.

In Florida, about three or four firms have applied for refunds, a Department of Revenue spokesman said. The state has notified those firms it knows have been collecting taxes on software sales and will accept refund applications for three years from the date the tax was paid, in accordance with state law, the spokesman said.

The refunds were begun as a result of an administrative hearing requested by Nova Computing Services, Inc., which determined that Florida statutes for sales tax do not authorize taxation of intangible property such as software [CW, Jan. 17].

Not Taxable in Alabama

In Alabama, the 10th Circuit Court has upheld a lower court decision that software is not taxable [CW, Nov. 15].

That decision was rendered in the case brought by Central Computing Services, Inc. (CCS), which used the same argument that was successful in Tennessee in the case

(Continued on Page 6)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM Reg U S Pat Off

EDITORIAL
Editor E. Drake Lundell Jr.
Deputy Editor Ronald A. Frank
Managing Editor Nancy French
Associate Editor Donald Leavitt
Associate Editor Esther Surden
Associate Editor Molly Upton
Assistant Editor John P. Hebert
Computer Industry Editor Tom Wiseman
Washington Bureau Edith Holmes
Staff Writer Catherine Arnst
Chief Copy Editor Cheryl M. Gelb
Copy Editors Bobbi C. Sternheim, Barbara T. VanScoyoc
Photography Editor Ann Dooley
Editorial Assistant Denise Petski
Editorial Cartoonist Jim Orton
Bureaus:
London Roger R. Frampton
Munich Dr. Gerhard Maurer
Asia Hidetsuna Sasaki
Contributors:
Education J. Daniel Couger
Legal Roy N. Freed
Taylor Reports Alan Taylor
Human Connection Jack Stone
Contributing Editor Edward J. Bride

SALES
Vice President/ Marketing Roy Einreinhofer
Advertising Administrator Judy Milford
Display Advertising Sara Steets
Classified Advertising Pam Palmer
Recruitment Advertising Kathy Steinberg
Sales Promotion Director Jack Edmonston
Market Research Kathryn V. Dinneen

CIRCULATION
Vice-President/ Circulation Margaret Phelan
Circulation Manager Barbara Jeannetti

PRODUCTION
Manager Lee Vidmer
Supervisor Henry Fling
Assistant Manager Peter Holm

Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone (617) 965-5800. Telex 92-2529

OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone (01) 485-2248/9. Telex 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristanstrasse 11. Phone 36-40-36/37. Telex 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone (03) 445-6101. Telex 26792

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160. Copyright 1977 by Computerworld, Inc. All rights reserved.

50 cents a copy. $15 a year in the U.S., $23 a year for Canada and PUAS, all other foreign, $40 a year. Four weeks notice required for change of address. Please allow six weeks for new subscription service to begin.

Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Walter Boyd.

Computerworld can be purchased on 35 mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone (313) 761-4700

COMPUTERWORLD, INC.
Board Chairman/ Publisher Patrick J. McGovern
President W. Walter Boyd
VP-Marketing Roy Einreinhofer
VP-Finance William P. Murphy
VP-Circulation Margaret Phelan

ABP mcc MEDIA DATA FORM

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Massachusetts 02160.ac

Software Ruled 'Tangible'

User Told to Return Programs to EDS

By Ann Dooley
Of the CW Staff

NEW YORK — Declaring software to be a "tangible" commodity, a federal judge here last week ordered F&M Schaefer Brewing Co. to return its applications software to Electronic Data Systems Corp. (EDS), pending further litigation.

U.S. District Court Judge Constance Baker Motley enjoined Schaefer from using the system unless it gave EDS $1.3 million.

EDS was also told to put up a $2.6 million bond dependent on the outcome of Schaefer's original suit, scheduled to be heard in November.

The hearing was a preliminary action to Schaefer's original suit claiming $115 million damages [CW, Sept. 13]. The hearing was brought by EDS to determine if Schaefer could be ordered to return the systems.

The granting of the repleven action enables EDS to take back the system even though money has been paid toward it by Schaefer.

Last week's action was not to determine damages, but just a claim to get the system back until the case can be decided on its merits.

Schaefer, represented by Thomas K. Christo, originally brought suit against EDS claiming the facilities management firm had developed an inadequate system that was substantially similar to Schaefer's original system.

In 1975, six years after the original contract began, Schaefer took over systems operations from EDS under an early cancellation clause in the contract.

The brewer failed to pay the cancellation fee covered in the contract because it claimed EDS had not honored its initial contract for development of a new system.

Schaefer claimed fraudulent practices by EDS when the firm misrepresented creating a new system, according to the defense. Schaefer was therefore not liable to honor the contract.

EDS, represented by the Kaye, Scholer, Fierman, Hays and Handler law firm from New York and the Hughes, Luce, Hennessey, Smith and Castle firm of Dallas, claimed the system was indeed newly created and filed a counterclaim for payment or permanent return of the system.

EDS stated payment under the contract was not dependent on the quality of the system. The firm further claimed Schaefer deliberately made misleading statements to induce EDS to turn the system over without planning to pay the early cancellation fee.

System Based on Concepts

The disputed system consists of magnetic tapes and disk packs containing computer programs and support documentation on Schaefer's business operations. It also contains I/O formats, flow charts, narrative descriptions and operating instructions.

Schaefer claimed the system was based on concepts and therefore could not be returned. Christo likened software to a musical song which can be recorded over and over again or even remembered and sung without the recording.

Schaefer contended that merely handing over a tape would not constitute handing over the system.

EDS' attorneys' claimed that the system consisted of "identifiable property which constitutes replevin."

The question of intangibility appeared to be a critical one to the decision of the replevin motion, but was passed over as insignificant by Motley.

The judge asked many questions of both parties that revealed little knowledge of computers, software and how the systems work. Further, she did not seem to fully understand the implications or concepts that were being decided.

Concurring with EDS's claim that software is a tangible commodity, she called much of Schaefer's testimony and evidence "irrelevant" to the case.

Although possessing little apparent knowledge of computer technology, Motley decided the EDS system was substantially a different and better one than Schaefer's original system because it used tapes instead of cards and a different language.

At one point, she stated the card system was obsolete and "can't be operated on a modern system."

The court found that EDS did develop a more modern and efficient system, that Schaefer's reasons for not paying the agreed upon early penalty fee were inadequate and that Schaefer deliberately took over the system without intending to pay any fee.

From these findings, Motley said EDS had presented a prima facie case and ruled in favor of EDS.

EDS attorneys would not comment on the decision or the case while the trial was still pending and even refused to disclose their own names.

Christo's only comment on the decision was "the order was improper and we're going to seek an immediate appeal."

After the decision was handed down, another Schaefer defense attorney, who refused to identify himself, complained the judge called Schaefers' witnesses out of order, many questions were deemed irrelevant by the court and the concept of software intangibility was not allowed sufficient explanation.

The Schaefer defense stated this decision would have bearing on its claim for damages. The trial on its merits, which will determine damages, will begin on Nov. 14, 1977.

Stock Bid Costs IBM Over $712 Million

ARMONK, N.Y. — IBM received about 2,546,000 shares of its own stock in response to its offer to buy at least four million shares at $280 each [CW, Feb. 28].

Purchasing the shares tendered will cost IBM $712.8 million. Four million shares would have cost $1.12 billion.

The price of IBM stock during the buying offer rose from $270.10 the day before the offer began to $284.50 the day it expired.

At year-end 1976, IBM had 150,766,927 shares outstanding. The mainframer also had cash and equivalents totaling $6.16 billion compared with $4.77 billion at the end of 1975.

During the offer, the brokerage firm of L.F. Rothschild & Co. expressed its view that, in addition to indicating IBM's belief that its shares are undervalued, the tender might also help smooth the supply-demand distortions for IBM's shares.

"IBM's outstanding qualities as an investment ensured it a place as a large core holding in most institutional portfolios," the broker said.

With the trend toward portfolio diversification, however, IBM is "often being used as a source of cash, since it has generally been 'overowned' relative to its 6.5% Standard & Poor 500 weighting," he added.

Some analysts believe much of the tendered stock came from institutional investors reducing their "disproportionate" holdings of IBM stock.

On the Inside This Week

NEWS

Nlets Denies Use of Its Network to Driver Registry 5
Welcker Blasts TAS for Lack of Privacy Guarantees 7
A Quiz on Ethics: What Would You Have Done? 8
Workshop Attendees Ponder Question of Ethics in DP . . . 9
EFT Commission Head Pleased by Report 10
Study Finds DP Budgets Up Average 10.2% This Year . . 11

EDITORIAL

Editorial: A Realistic Method 14
Human Connection: Technologies Stymied by Fear 15
Taylor Report: Contract Clauses Keep Site Up 15
Disc vs. Disk Controversy: One of Life's Small Wars 16
DPers Can Bridge Job Displacement Gap They Create . . 25

SOFTWARE & SERVICES

Altair 8800 Micro Users Get Business Applications 27
'Tracer' Eases Fortran Debugs for DG, DEC Minis 28
Monitor Gets Airline's TSO Control off the Ground 30
Compiler Optimizes Fortran on Cray-1 32

COMMUNICATIONS

DP Principles Seen Key to Net Design 33
Diagnostics Promoted as Critical Aspect of Networks . . . 34

TERMINAL TRANSACTIONS

Two EFT Units for Retailers Available From TRW 34
Computek Series 200 Enhanced 38

SYSTEMS & PERIPHERALS

Independent Gear Speeds CPU Services 39
OBM Enhances OCR System 42
In-House Printing of Tags Helps Apparel Maker 44

MINIWORLD

HP Reconfigures 3000 Series II Models 45
Hospitals Can Achieve 'Spectacular Results' 46
Small Business System Reduces Firm's Invoice Time . . . 47
Mini Systems Track Firms' Lock Washer Inventory 49
TI 990 Users Get Software Development System 50

COMPUTER INDUSTRY

Nonappearance of Express Causes Dissension 51
IBM Seen Enhancing Mid-Life 370s to Foil PCM $ 51
Telenet Sees 250 Packet-Switched Users by Year-End . . 53
Incoterm Targets Vertical Applications 55
Five Crucial Factors Cited for OEM Selection of Mini . . . 57
Aerospace Contractor Takes Off in Service Mart 58

Senate Gets Second Try at Creating Grants Data Base

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — A bill that would establish a computerized system for dispensing information on federal domestic assistance programs to state and local governments has been introduced by senators Edward M. Kennedy (D-Mass.) and William V. Roth Jr. (R-Del.).

Similar to a bill that was passed by the Senate last year but never got out of the House of Representatives' Government Operations Committee, the proposed Federal Program Information Act would provide a single source of current data on federal grants and loans.

Cosponsored by senators Edmund S. Muskie (D-Maine), Charles H. Percy (R-Ill.) and Lawton Chiles (D-Fla.), the bill calls for a system to be operated and controlled by the Office of Management and Budget (OMB), the governmental unit now responsible for issuing the annual hard-copy *Catalog of Federal Domestic Assistance.* Last year's version of the bill had designated the General Services Administration as the agency responsible for the system.

The new bill provides for the transfer of the Federal Assistance Program Retrieval System (FAPRS) — the computerized program that sparked congressional interest in such a system — from its home in the Department of Agriculture to OMB.

FAPRS, created by Paul R. Kugler and the Plans and Programs Staff of the Rural Development Service at the Department of Agriculture, would form the nucleus of the OMB center, Roth suggested.

The center would have a director within OMB and would continue to publish various versions of the *Catalog of Federal Domestic Assistance*.

The new bill calls for a system that can provide financial information on the amount of funding each program received as well as how much money actually remains for which communities may apply — an improvement over Kugler's original system.

Kugler and his staff are currently working to develop the capability to track grant funds on-line to meet this requirement. The system already tells inquiring communities what programs are available and pinpoints the ones for which they are eligible.

The bill suggests a total of $2.9 million be spent on the system and developing the center over a three-year period.

'Art of Grantsmanship'

"The art of federal grantsmanship — the ability to identify, apply for and receive federal grant awards — has become a major impediment to small or disadvantaged communities, school systems and colleges trying to obtain a fair share of federal grant money," Roth said in a statement introducing the Federal Program Information Act and printed in the *Congressional Record.*

Kennedy noted "in many instances states and larger cities spend a considerable amount of money maintaining Washington representatives to keep abreast of changes in federal programs.

"Smaller cities and towns that cannot afford a full-time 'grantsman' are penalized by receiving less than their fair share of participation in federal programs," he said.

Both Kennedy and Roth sponsored this legislation based on their belief the government has a responsibility to provide "sunshine" for federal assistance through "full, fair and timely disclosure of program information."

In 1950, federal grants to state and local governments totaled $2.2 billion; the total is expected to exceed $71 billion in fiscal year 1978, Roth noted.

Roth has personally led the battle to unlock information about the programs which draw on these funds. When he first came to Congress 10 years ago, he said, no one knew how many programs existed and there was no place to which state and local government officials could turn for full and complete information on federal programs.

He and his staff conducted a study in 1968 and 1969 to identify and describe every federal program by name and department. That study resulted in the catalog published by OMB ever since Roth's initial effort.

It was OMB that provided the chief resistance to the Kennedy-Roth bill last year, arguing the existing catalog provided enough information on available federal funding.

"Any intelligent person can use the catalog and do what FAPRS does," OMB assistant director for budget review Dale McOmber said last fall. The catalog is available on magnetic tape for those who want to use a search program on it, he stated.

James McIntire, a new deputy administrator at OMB, may take a different view of FAPRS, however. McIntire ran FAPRS in Georgia last year, where he was head of community affairs for the state government.

HIS Users Planning To Stockpile Parts

CHICAGO — A group of 17 computer users who own and maintain an assortment of older Honeywell Information Systems, Inc. equipment met here recently as a step toward establishing a self-help users association.

By stockpiling and exchanging spare parts, these System 200, 1201, 1250 and 2200 users hope to "ensure and enhance" the useful lives of their systems, according to George W. Jordan, president of Compucenters of Corpus Christi, Texas.

These users, who chose not to sign HIS maintenance agreements, have waited as long as 39 to 52 weeks for replacement parts as a result of official HIS policy that favors contract customers, Jordan indicated.

An HIS spokeswoman confirmed that the policy for providing spare parts to users without maintenance contracts is essentially unchanged. However, the leadtime required for ordering parts has been reduced to "up to 30 weeks."

This policy does not apply to Level 6 system users without maintenance contracts, she added. These customers are supplied with "optimal replaceable units" 15 to 30 days after receipt of order and, in emergency situations, HIS can turn an order around in 48 hours.

The users meeting here agreed to work toward establishing a system for stockpiling and exchanging spare parts and providing assistance to one another as needed.

The 17 users own about 80 systems.

Wilson Grabill, president of Integrity Systems, Inc. of Cincinnati, was elected chairman of the steering committee, and Jordan was elected treasurer.

Another meeting is planned here June 6.

ADR's Automated System Charter™ (ASC) Helps Mobil Oil Stay Ahead

Change at Mobil Oil's New York Headquarters DP Department is a way of life. Over 300 systems are in constant use. And this year 100 systems may be extensively changed and 20 new ones added. "Maintaining up-to-date, standardized systems documentation by hand would be nearly impossible," according to Client Services Supervisor, Jean-Louis Legrand.

ASC produces new documentation in minutes

Mr. Legrand recently helped Mobil Oil install ADR's Automated System Charter (ASC) as a primary tool for computerized documentation maintenance. By using ASC, Mobil has gained many advantages including the establishment of new and simpler standards for programmers. Each time there is a system change, the programmer describes the change on a form submitted through one of Mobil's Client Coordinators for entry into ASC. This results in an automatic documentation update which can be sent throughout the DP Department by printing out a completely new report, produced at only a fraction of the former cost. Reports which would have taken up to 4 days to organize and type manually are now produced in a few minutes—automatically, through ASC.

ASC lets Mobil run systems faster

ASC gives Mobil's Client Coordinator a comprehensive, uniform, and up-to-date tool containing all the instructions he needs to run a system. Because ASC automatically standardizes documentation, the Client Coordinator understands a system faster and can run even a new system after only a few hours of study.

"An important aspect of the ASC document is that it now contains a very clear definition of all the reports coming out of a system along with detailed instructions on how they are to be distributed," Mr. Legrand added.

Improved backup is important

ASC has enabled Mobil to record all system documentation on one tape, with JCL in one library and descriptive comments in another. By dumping these two libraries, Mobil has full backup of all or any part of their documentation. Any report can be reproduced in just a few minutes.

No longer any doubt about being up-to-date

"With ASC, being up-to-date is almost automatic. When changes recur, ASC gives our Client Coordinators the ability to quickly make a copy of the complete, updated document so that everyone can work with the latest information," said Mr. Legrand.

ASC improves system chart quality, cuts costs

"ASC has let us document a system in about half the man-hours we would have normally used. And we have the advantage that the results are more uniform and complete. We do not miss steps as we might in a manual report, and the system chart and program steps are always printed in the same way," Mr. Legrand concluded.

ADR software products are an integral part of over 5,000 installations worldwide. Each ADR product is not just a program, but a complete package with full documentation and on-site support. ADR is the only software company with 50 branch offices and representatives in over 30 countries—each staffed with ADR-trained technicians.

For more information on what ADR software can do for you, call or write
APPLIED DATA RESEARCH THE on-line SOFTWARE BUILDERS®
Route 206 Center, Princeton, N.J. 08540, Phone: 609-924-9100.

ADR software products: In use at over 5,000 installations worldwide.

U.S. offices in Boston (617) 245-9540, Chicago (312) 694-2244, Cleveland (216) 228-0880, Houston (713) 526-3188, Los Angeles (213) 826-5527, New York (212) 986-4050, Princeton (609) 924-9100, Washington, D.C. (703) 281-2011

Foreign offices in Australia, Austria, Belgium, Brazil, Canada, Denmark, England, Finland, France, Germany, Holland, Hong Kong, Israel, Italy, Japan, Korea, Malaysia, Mexico, New Zealand, Norway, Philippines, Portugal, Puerto Rico, Republic of South Africa, Singapore, Spain, Sweden, Switzerland, Taiwan, Thailand, Venezuela

OMB Finds Cost of Privacy Act Less Than Expected

(Continued from Page 1)

Personnel training by the agencies themselves and through courses developed by others such as the Civil Service Commission accounted for the second largest chunk of start-up costs — $6.8 million, or 23.2%, of the total, the survey report said.

Reports and other related administrative details required by the act comprised the third largest portion of start-up costs — $3.7 million or 12.7%.

On a continuing basis, these reports represented 11%, or $4 million, of the agencies' Privacy Act operating costs.

Tracking Costs Higher

The requirement that agencies keep records of disclosures of individuals' records was estimated to cost almost as much as granting access to records, OMB said. The $9.4 million or 25.7% of total Privacy Act operating costs expended on tracking disclosures was "substantially greater" than expected, the agency added.

By contrast, the cost of the additional security and control measures required by the Privacy Act was less than anticipated, the survey indicated. OMB suggested this may be due to a variety of factors, among them that some agencies with well-managed systems found they needed to do little more to comply with the act. Other agencies have not yet adequately addressed security requirements.

The agencies responding to the OMB questionnaire did not report significant cost reductions from systems eliminated as a result of privacy considerations.

The budget agency attributed this to the difficulty of determining whether and how many new systems have been scaled down or not developed at all as a result of the Privacy Act. Still another factor in the lack of cost reductions from systems scrapped might be the initial emphasis on complying with the publication requirements of the act and, therefore, to accept and report current systems "as is," OMB added.

"The Department of Defense accounts for approximately one-third of all systems of records and 48% of the total Privacy Act operating costs reported for all agencies," OMB said.

OMB suggested Defense's high expenditures might be the result of a greater understanding of access rights by its military and civilian personnel. Such a conclusion would be consistent with the President's First Annual Report on the Privacy Act which said that, except for access to law enforcement systems, most requests for access to records were being made by federal employees.

The cost of granting access to records for four Cabinet-level departments (the departments of the Treasury, Defense, Justice and Health, Education and Welfare), the Veterans Administration and the Central Intelligence Agency accounted for 26.5% of the total Privacy Act operating costs for all agencies and 93% of the cost of granting access, OMB said.

While related in part to the numbers of systems and records these agencies maintain, the cost of granting access also appeared to be a function of public interest in the records of certain agencies. Agencies such as the Justice Department maintain complex records, which adds to the cost and time consumed in granting access,

The agency said it remains to be seen whether the cost of granting access to records was the result of an initial wave of public interest or an indication of continuing and possibly increasing public demand.

Size Differences

In its survey, OMB identified 21 major agencies responsible for publishing 87% of the notices of record systems containing 98% of the records reported. These agencies accounted for 92.6% of the start-up costs and 97% of the operating costs in the executive agency's report to Congress.

"This would suggest that, as might be expected, start-up costs are more sensitive to the number of agencies and systems, whereas operating costs are more sensitive to the number of records," OMB said.

The cost of granting access to records was a significantly greater proportion of operating costs for the larger agencies (29.6%) than for the smaller agencies (14.8%).

OMB also found administrative overhead costs constitute a proportionately greater share of operating costs for smaller agencies — 33% — than for the larger agencies — 10.3%.

Finally, the cost of security and control in larger agencies is less than 4% while it accounted for more than 8% of the operating costs reported by smaller agencies.

"This could indicate there are economies of scale in system security: that is, it is relatively less expensive to establish security in larger systems, or that larger agencies already had adequate security systems in place," the survey report said.

Acting on the information received through its survey, OMB plans to determine whether the unexpectedly large cost areas, such as accounting for disclosures, can be reduced either by administrative action or by improvements in the law without defeating the objectives of the Privacy Act.

With additional experience with the act, OMB also hopes to learn whether the costs which are a function of external demand, such as granting access and correcting records, are greater or less than the agencies' estimates.

Overall, OMB's goal is to evaluate the cost-effectiveness of the Privacy Act, according to the survey report. Such a review must deal with the extent to which the act is preventing the development of new systems or constraining their content and use.

sued by eeo?

The chances are good. Last year, 80,000 workers won $125 million from their employers on EEO violations.

There is a solution . . . First, don't discriminate in hiring, in compensation, in promotions and in pension benefits.

Second, use a Wang Human Resource Management System on your 360/370, Burroughs, Honeywell, or Univac, to allow your Personnel people to prove non-discrimination.

For more, call Joe Nestor at (617) 851-4111, Wang Laboratories, Inc., Lowell, MA 01851, or, in California, call Carl Tarascio at (714) 631-0138.

WANG

PDP-11/60 Has Cache Memory

(Continued from Page 1)

70 but, because it is organized in a different manner, it has a different hit rate.

DEC reported a 93% hit rate in cache for the earlier PDP-11/70 but an 87% hit rate for the PDP-11/60.

Memory for the system can be either MOS or core. The MOS memory has an error-correction code feature for greater reliability, the firm said, and battery backup is standard.

Optional features for the 11/60 include an external high-speed, floating-point processor, user-microprogrammed control store, extended control store and a diagnostic control store.

Called the "hot processor," the external floating-point processor for the 11/60 is used to augment the integral processor. For example, the unit performs double-precision multiply between registers at 3.74 msec; the auxiliary processor allows the system to be almost as "fast as some special-purpose systems optimized for a specific programming language," the spokesman claimed.

User, OEM Options

The optional user control store (UCS) allows a user to tailor the 11/60 to his particular application. The UCS includes a hardware module and software tools for microprogram development, according to DEC.

Another option, primarily of interest to the OEM, is the extended control store module that allows special functions developed with the UCS feature to be placed into programmable read-only memory.

The diagnostic control store module was designed for the "sophisticated" user who wants to replace malfunctioning CPU modules himself. The diagnostic module, which tests itself and the CPU in about 30 sec, helps bring down field service costs.

The 11/60 runs under DEC's RSX-11M operating system and is software-compatible with other members of the PDP-11 line, the spokesman noted. It supports Basic-Plus-2 and Dibol along with Fortran-IV-Plus.

The basic PDP-11/60 with 256K of memory, 28M bytes of disk and the hard-copy terminal in an integrated cabinet costs $44,700. The CPU and memory for OEMs costs $35,700.

The "hot processor" costs $5,600. The UCS option costs $5,000, extended control store is priced at $1,200 and the diagnostic control store costs $3,800.

Deliveries of the PDP-11/60 are slated to begin in June.

ON ANY TRACK WE'RE HARD TO BEAT

When you talk about leasing an IBM/370, you are on a fast track. Each leasing company claims it has the best program for you. But does it? With over $200 Million of IBM/370 equipment on lease in the U.S. and overseas, Alanthus' customers are saving more than $17 Million annually. That's a real winner!

Our leases are unmatched in flexibility. We can offer you a short operating lease, a long term financial lease, or even a revolving lease. Working with you, we can custom tailor the lease program to suit your needs. You win again!

Our lease documentation is easily read and understood. It consists of only four pages plus an equipment schedule. Another winner!

Call the people from Alanthus.
We have the lease program that's best for you.
We're winners on any track.

alanthus corporation

ALANTHUS CORPORATION
111 High Ridge Road
Stamford, CT 06905

(203) 348-4820

ICC—ALANTHUS GMBH
Ahrensburger Strasse 150
2000 Hamburg 70
West Germany
040/66 79 22

NDR Looking for Way to Upgrade

Nlets Denies Use of its Network to Driver Registry

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The National Law Enforcement Telecommunications System (Nlets) board has voted against providing its network to meet the communications needs of an enhanced National Driver Register (NDR) system.

NDR, which helps keep drunk, reckless and other bad drivers off the roads by sharing license revocation information between the states and territories, had initiated plans to upgrade its system after a recent study by Rockwell International found states may drop out of NDR because they are not getting information fast enough [CW, Jan. 10].

The Nlets vote throws a monkey wrench into the NDR's plan to upgrade its slow batch-and-mail information exchange system into an efficient real-time system.

The NDR has asked the Nlets board to reconsider its decision. The state-based network is unlikely to do that, however, until its annual meeting this May in Atlanta, according to C.J. Beddome, Nlets executive director.

Without Nlets, the register will have to build its own dedicated system with dial-up lines or seek access to commercial alternatives, but these substitutes are more costly and present more serious privacy problems, a source close to the federal agency administering NDR said.

Described as "the most suitable alternative" to satisfying the communications requirements of an upgraded NDR that would provide the states with more timely responses to their license queries, Nlets is a network already in place and familiar with federal privacy regulations.

Nlets is also currently accessing state driver files, according to the study conducted by Rockwell International for the National Highway Traffic Safety Administration (NHTSA), which runs NDR here.

Despite these advantages to NDR, the Nlets board is concerned that the volume of traffic generated by the register will be too much for the network, according to Norman Darwick, director of the International Association of Chiefs of Police (IACP), Division of State and Provincial Police. The IACP participates in Nlets.

Full implementation of the enhanced NDR system will mean 80,000 to 100,000 inquiries will travel over the Nlets lines each day, primarily between 8 a.m. and 5 p.m., Darwick said. But he and the IACP would like to see Nlets accept an NDR pilot program, which would involve data from 10 states and mean between 5,000 and 6,000 driver license inquiries daily.

Nlets is currently operating at only 20% capacity, and state chiefs of police are talking to their representatives on the Nlets board to learn whether there are any other reasons behind the network's refusal to accommodate NDR, Darwick said.

Aware of the strain the full-blown NDR system could put on Nlets, the Rockwell report recommended that NHTSA agree to furnish the network with a minicomputer and a direct line between the NDR center here and the Nlets central facility in Phoenix, Ariz., if the pilot program indicated this additional equipment would be required.

The agency has accepted this suggestion, a source said.

NHTSA has no desire "to put inappropriate pressure" on Nlets; its officials would simply like the network's board to think about NDR again, the source added.

Paid for by $2.7 million in federal funds made available through the Law Enforcement Assistance Administration, Nlets is a state-owned organization, he noted.

Although the network is not subject to the provisions of the Privacy Act of 1974, it is involved in the transmission of criminal justice-related data and must follow Justice Department security and privacy regulations for such systems, the source said.

In addition to satisfying privacy and security requirements, NDR's use of Nlets would benefit U.S. taxpayers because it would make building a similar communications facility unnecessary, he stated.

Existing alternatives to Nlets are also more expensive and would present more serious privacy problems, the source suggested. If NDR were to go with Telenet, for example, the chances of misrouting information would be much greater since NDR would no longer be the facilities manager, he said.

The Data Transmission Co. was NDR's "second best alternative" until it went out of business last year, the source said..

The Rockwell report emphasized the importance of NDR's continued adherence to the dictates of the federal Privacy Act, but recognized the register would have to obtain the voluntary cooperation of the states.

NDR has no wish "to get in bed" with the law enforcement agencies, the source said.

Point Confirmed

IACP's Darwick confirmed this point. Despite its unanimous support last month of including NDR — at least in pilot form — on the Nlets network, IACP and the law enforcement agencies it represents won't gain easy access to driver records, he said.

Federal law now prohibits these agencies from getting their driver information from NDR; they must apply for license records through their own motor vehicle departments.

While NHTSA waits for a rehearing of the NDR project by the Nlets board, the agency is continuing to take the steps necessary to receive approval for the enhanced driver register system.

Rockwell has completed the second half of its study, which provides the system design and detailed specifications for development and integration of the software, hardware and procedural components of a rapid response capability for the NDR. NHTSA has accepted this study and will next seek approval from the Department of Transportation, an NHTSA spokesman said.

Once Transportation has approved the new system, the agency will take the NDR request to the Office of Management and Budget and from there to Congress, the spokesman said.

If the Privacy Protection Study Commission is still in existence after it reports to Congress in June, it will be asked to review the privacy plan for NDR, he added.

AGAIN - - CA-SORT IS NUMBER ONE !

Yes...CA-SORT earns Datapro "Honor Roll" status again ... and is the highest rated sort software product !

In fact, CA-SORT is in the upper 5% of all software systems reported by Datapro! It is the only top-rated sort system with over 1200 users that installs without training in just ten minutes!

Let these quotes from DATAPRO 70 tell more of the story:

"The claims for this sort package may seem far-fetched, but if one looks at the success...and the ratings afforded...in the 1975 Datapro Survey...(where it was named an Honor Roll package) the claims seem to hold up...

"The users indicated that the sort package can 'run in 40 to 50% less work space than the typical IBM sort,' and that an average of 25% savings can be realized in CPU time."

"For IBM computer users who would like to increase the efficiency of their sorting operations, CA-SORT looks like an attractive choice."

BUT DON'T TAKE DATAPRO'S WORD—
TRY CA-SORT FREE FOR 15 DAYS!

The proof is in your pudding. So put CA-SORT to work for you...start saving with the very first sort run. It takes just ten minutes to install, requires no training at all.

COMPUTER ASSOCIATES

U.S. OFFICES: New York, Georgia, Illinois, Michigan, California, District of Columbia, Texas, Connecticut
WORLDWIDE OFFICES: Australia, Austria, Belgium, Denmark, France, Germany, Holland, Italy, Japan, United Kingdom

CA-SORT IS FROM
COMPUTER ASSOCIATES!

An organization of professionals dedicated to the development of advanced software products that are ..."superior by design". That's why CA-SORT scored 3.8 out of a possible 4 in the Datapro ratings for "overall satisfaction". That's virtually the highest scored by any system with a broad base of users.

MAIL COUPON OR TELEPHONE COLLECT TODAY
FOR DETAILS ABOUT THE FREE TRIAL OF
CA-SORT IN YOUR OWN INSTALLATION.

FILL-IN AND MAIL TODAY

Computer Associates CW 3/21
655 Madison Avenue, New York, N.Y. 10021

YES! Start us on the way to a FREE 15-day test of CA-SORT, the Number One Sort software product in the country.

Name ....
(Please print)
Title ....
Company ....
Address ....
City .... State .... Zip ....
Telephone Number ....
(Area code please)
Computer Model .... System ....

FOR FASTER SERVICE, TELEPHONE COLLECT (212) 355-3333
© 1977 Trans-American Computer Associates, Inc.

Fla. to Refund Software Taxes; Other States Deciding

(Continued from Page 1)

of Commerce Union Bank vs. George M. Tidwell, according to CCS President Dewey H. Crim.

The State Supreme Court is currently reviewing whether to let the decision stand, Crim said, adding this is the normal sequence of events.

The state had sought $13,519.91 in retroactive use tax and penalties on banking packages the firm had obtained from University Computing Co.

CCS used the Tidwell argument — that software contained on the pack or tapes was intangible and the medium was inconsequential — and attached a copy of the Tidwell decision to its brief.

Wisconsin Deciding on Services

In Wisconsin, the legislature's Joint Finance Committee is considering a budget package that includes a paragraph which would make a range of services subject to the state's 4% sales tax. Software is already taxed here.

The proposal in Senate Bill 77, Section 844 would tax: "the sale of computer and data processing services, including time-sharing, designing or converting systems, programming, consulting, training, reformatting of data and computer printing."

Glenn Jacobson, general manager of Professional Data Processing, Inc., went to the hearing, but said he was dismayed by the lack of interest among other firms offering DP services.

"There seems to be a lot of complacency and the attitude that they can't fight the state so what are we going to do," he said.

To his knowledge, the proposed statute would be more encompassing than that in any other state, certainly more so than in New York, Jacobson said.

And it represents a dangerous precedent, he noted.

The joint committee indicated it expects the motion to yield $8 million a year in revenues, Jacobson said.

The budget package could come before the Joint Finance Committee as early as this week, a spokeswoman said.

New York Postponed Clarification

New York has postponed from March until April the issuance of clarifications of its regulations pertaining to taxation of software and DP services.

In the meantime, the state is assessing various software firms on sales made within the past three years, sources reported.

In New Jersey, a group of representatives from the services industry is requesting a meeting with Sidney Glaser, of the Department of Taxation, to clarify the state's position, according to George Raymond, president of Automatic Business Centers, Inc.

Raymond said the current New Jersey statutes are vague as to what is being taxed.

The group will be represented by the attorney retained by the Association for Data Processing Service Organizations (Adapso) — Sandy Goldberg of Roberts & Holland, a New York law firm.

California Holding Hearings

In California, Adapso is holding a meeting for firms interested in the California tax situation on March 23 at the Sheraton Hotel at the San Francisco airport.

A preliminary hearing with the California Board of Equalizers and Remote Computing Corp. (RCC) was scheduled for last week, at which time RCC's director of administration, Ryan Schmelz, planned to argue against the policy of taxing software.

RCC has been assessed on royalties it has been paying to out-of-state owners of programs it offers on its network.

The firm is protesting the assessment and is also petitioning for refunds of the taxes it has been collecting from users so it can refund these, he said.

The state assesses sales taxes on tangible personal property, Schmelz said. Since programs and data don't fall into that category, the collection of taxes on them exceeds statutory authority, he explained.

Furthermore, the state regulations do not look to substance but to the form, Schmelz said. This seems inconsistent and thus violates the state constitutional requirement of consistency in taxation, he added.

For instance, in both the royalty area and in data preparation, if the program or data is transmitted on-line to the recipient, there is no taxable transaction.

But if the same information is relayed via magnetic tape or card, it is taxable, he said.

Nonregulated AT&T Unit Urged

(Continued from Page 1)

sure the freedom of carriers to "provide a complete communications service involving long-term evolutionary improvements in communications processing equipment," he said.

The prohibition against carrier entry into the DP business should not be an obstacle to that freedom, he added.

The latest action of the FCC in amending the definitions proposed by the commission for the Computer Inquiry were explained by Walter Hinchman, chief of the Common Carrier Bureau.

The expanded scope of the new definitions are meant to address "all processing activities whether performed at a central location, at the customer's premises or at intermediate locations within or interconnected with a telecommunications network," Hinchman said.

A new definition of DP has been proposed to take into account that processing activities are not confined solely to a central computer and "to make our rules applicable to determining the nature of the carrier's processing activities — regardless of location or system structure," he said.

The FCC has proposed that DP be defined as the "electronically automated processing of information wherein the information content or meaning of the input information is in any way transformed or where the output information constitutes a programmed response to input information," Hinchman explained.

The proposed definition talks in terms of processing activities where an activity is the aggregate end result of a combination of operations irrespective of where they may be performed.

The commission would look to the end result of the processing activity in determining whether a carrier is engaged in data processing or communications, he said.

"The inquiry recognizes that it may no longer be possible or practical to distinguish between the two functions from a regulatory standpoint," he said.

Since it is now possible to combine DP and communications in a single customer-premise terminal, the commission has also asked for comments on whether such terminals should be considered a communications common carrier activity.

These comments also relate to the 1956 consent decree prohibitions against AT&T, Hinchman said.

In addition, the commission has asked for comments on ways to revise the Communications Act of 1934, currently being rewritten by the House Subcommittee on Communications.

These are just proposals and the commission is actively seeking comments from users and other interested parties.

"We encourage your participation in this proceeding so the commission can have the benefit of your knowledge and expertise in the area of data communications," Hinchman told the attendees.

Hopper Slated to Speak At NCR Users Conference

ST. LOUIS, Mo. — Capt. Grace M. Hopper, a leading computer industry figure since the mid-1940s, is among those who will address the Seventh Annual Federation of NCR Users Conference here April 24-27.

Hopper, whose pioneering efforts in programming languages influenced the development of Cobol, will discuss the past, present and future of DP.

Dr. John W. Demidovich, professor of computer systems analysis at the Air Force Institute of Technology School of Systems and Logistics, will keynote.

Other speakers will include Dr. Jack Stone of Computer Education International, Inc.; Gopal K. Kapur, president of Kapur and Associates and coauthor of *Fifty Questions the Chief Executive Should Ask of (Or About) His DP Manager*; and John M. Lusa, editor of *Infosystems*.

MOORE BUSINESS FORMS, INC.

Just one of the many leading companies you'll see at

COMPUTER EXPO 77

Moora brings the Total Concept Package to mini-computer users. Forms...from source input to continuous output, from paper saving Moora Speediread to carbon aliminating Moore Clean Print. Supplias -- from data storage devices to ribbons and binders. After-writing forms handling equipmant too. And free system couseling and form design services. There are over 2,700 Moore representatives to serva you. . .averywhere.

Organized by:

COMPUTER CARAVAN 77

The national computer exposition thet's coming to you.
797 Weshington Street, Newton, MA 02160
(617) 965-5800.

Sen Frencisco • Los Angeles • Clevelend • Minneepolis/St. Peul
Chicego • New Vork • Philadelpie • Weshington, O.C. • Boston. Sterts March 29th

Need faster data flow on your multi-mini network?

Now you can get it... with HYPERbus™!

If the weakest link in your multi-minicomputer configuration is intercommunication, HYPERbus is your solution.

HYPERbus offers the speed, economy, and flexibility never before available:

- Speed: up to 50 Mbits per second
- Economy: replaces leased lines with private cable
- Flexibility: up to 64 drops on a single line

HYPERbus combines high-speed transceivers with a coaxial data trunk to achieve optimum inter-mini communication, resource sharing, and multiprocessing — even where multi-manufactured equipment is employed.

So don't delay.
Strengthen your multi-mini link today.

OEM & mfg. reps welcome

Network Systems Corporation
6820 Shingle Creek Parkway
Brooklyn Center, MN 55430
(612) 566-5050

Calls for Hearings on Allocations

Weicker Blasts TAS for Lack of Privacy Guarantees

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — The Internal Revenue Service (IRS) has not made a sufficient commitment to taxpayer privacy in its plans for a distributed tax processing system, Sen. Lowell Weicker (D-Conn.) charged here recently.

During hearings by the Senate Subcommittee on Treasury, Postal Service and General Government Appropriations, Weicker said the study of the proposed Tax Administration System (TAS) by the Office of Technology Assessment [CW, Feb. 21] suggested "nothing to give me any confidence in the privacy of this system whatsoever" and called for separate hearings on the allocation of funds for the project.

The senator also said he fully recognizes the need for computer systems in the collection of taxes, but emphasized the IRS must guarantee the TAS would only be used for that purpose.

IRS administrators, including Patrick Ruttle, assistant commissioner for IRS Data Services, appeared before the Senate subcommittee to discuss the agency's budget for fiscal 1978. The IRS has allocated $3 million of its budget for evaluating, testing and approving vendor designs for TAS.

In defense of the laws already governing the IRS which would continue in effect when TAS is fully operational in 1985, the commissioners pointed out the IRS cannot disclose tax information without a court order.

IRS officials also noted they can't assure citizens that the agency's present computer system provides 100% protection in the area of privacy. If anything, TAS should bring the IRS much closer to this standard.

"We will learn from our experience with the old systems," one assistant commissioner said.

The fiscal 1978 budget, which begins in October, sets aside money for TAS in the event Congress approves the system by this summer [CW, March 7].

Should the House and Senate Appropriations Subcommittees do so, the IRS will issue a request for proposal (RFP) for TAS to computer vendors at that time, Ruttle said.

Strong Support Sought

The IRS would also appreciate strong support from the Carter Administration. Ruttle told the senators the agency will come back to them for formal approval of TAS once it has received an official go-ahead from the Department of the Treasury and the Office of Management and Budget.

The Treasury has already given TAS a nod and "does not favor an overhauling of the concept," another IRS official said.

The General Accounting Office (GAO) has also endorsed the system, following two separate studies, Ruttle stated. He noted IRS, in its TAS proposal, made a number of improvements to assure taxpayer privacy, based on extensive comments from the GAO.

The agency also has answered additional issues raised by the GAO last year. These include concerns that the system be developed in an evolutionary manner, that the necessary computing and communications equipment be available to make TAS work by the mid-'80s and that procurement plans and cost-benefit studies for TAS be updated.

As he had assured the House counterpart to the Senate Appropriations Subcommittee earlier in the week, Ruttle said the cost of maintaining the present IRS computer system between now and 1985 will be $627 million.

By mid-1985, the bulk of this equipment will be obsolete and the cost of replacements will approach $100 million.

The IRS can either spend $727 million to maintain the status quo or the anticipated $851 million to develop TAS, Ruttle stated. He added it is true the computer capacity now planned for TAS will not last beyond 1985, thus increasing the cost of the distributed network beyond that date.

IRS officials assured the senators they welcome the opportunity to appear before Congress in hearings on TAS.

NCC Not Forgetting Computer Hobbyists

DALLAS — The 1977 National Computer Conference (NCC) here will feature a Personal Computing Fair, a Personal Computing Exposition, two full days of program sessions and a National Club Congress as well as special interest sessions for computer hobbyists.

The Personal Computing Fair, scheduled to run June 13-16 — the four days of the NCC — will feature operational displays and demonstrations of individually and group-owned noncommercial projects.

Technical sessions will include two three-hour panel sessions on Wednesday to examine the past, present and future of personal computing as well as hardware for the computer hobby market.

Thursday's agenda contains a three-hour panel covering personal computing software, a variety of papers relating to personal computing and a panel on the future of retail computer stores.

Plans are being developed for the National Club Congress to enable representatives from clubs throughout the U.S. to swap ideas and discuss their activities.

Additional details are available from the American Federation of Information Processing Societies, the conference sponsor, at 210 Summit Ave., Montvale, N.J. 07645.

IEEE Seeking Director

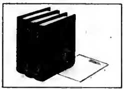
NEW YORK — A search committee has been selected to seek a replacement for H.A. Schulke Jr., who resigned as executive director of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) effective July 22.

Robert H. Tanner will chair the committee composed of John E. Barkle, Carleton A. Bayless, Donald G. Fink and Arthur Stern.

All IEEE members have been urged to submit names of people they believe are qualified to Tanner at IEEE headquarters, 345 E. 47th St., New York, N.Y. 10017.

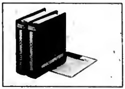
Try Datapro for 30 days!

You can use any one of Datapro's information services for 30 days with no purchase obligation. Investigate new products, compare their costs, check specs, performance, and users' ratings. Review the competition. In short, see for yourself why over 100,000 EDP professionals rely on Datapro information.



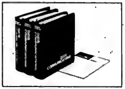
Datapro 70— The EDP Buyer's Bible

The world's most popular EDP information service. Used by EDP professionals in over 10,000 installations worldwide. The first and only complete, comprehensive reference service on EDP hardware, software, services and suppliers. •Computers •Peripherals •Data Communications •Software •Media & Supplies •Suppliers •Feature Reports •User Ratings •Case Histories •Profiles of Thousands of Products •*Newscom* Newsletter



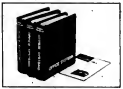
Datapro Reports on Minicomputers

Incisive reports and commentary on all aspects of the dynamic minicomputer and microcomputer industries. With the continued and rapid evolution of micro-mini technology and applications, this is a vital tool for DP professionals in every segment of the industry. •Feature Reports •Case Studies •Minicomputers •Microcomputers •Small Business Computers •Software •Peripherals •Vendors •*MiniNews* Newsletter



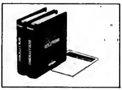
Datapro Reports on Data Communications

A totally different service offering broader scope and greater depth on the complete universe of data communications products, services and techniques. Includes product profiles, feature reports, user ratings, comparison charts, easy-to-read tutorials. •Glossary •Concepts •Computer Systems •Processors •Software •Terminals •Telephone Systems •Transmission Facilities •Modems •Multiplexors •Remote Computing •Suppliers •*Datalink* Newsletter



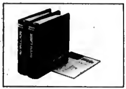
Datapro Reports on Office Systems

This service provides information on the full spectrum of office products, systems, techniques and companies. For all levels of office management. •Word Processing •Copiers & Duplicators •Typewriters •Dictation •Telephone & Voice Communications •Microform Systems •Programmable Calculators •Printing & Composition •Mailing & Addressing •Audio/Visual •Facsimile •*OfficeNews* Newsletter



Datapro EDP Solutions

Results-oriented answers to the challenges facing EDP management, presented in documented, non-technical terms. Proven solutions to unavoidable problems of EDP personnel management, systems development, operations optimization, standards, procurement and other areas. •Technology Update •Systems Development •Operations •Technical Support Functions •User Ratings •Supplier/Association Directories •Glossary •*Newsbriefs*

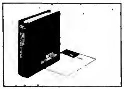


Datapro Directory of Software

This monthly updated directory service from Datapro provides objective, uniformly written software product profiles to help you compare and select the most effective packages for your applications. Indexed four ways. •Objective Software Descriptions •Users' Software Ratings •New Listings Monthly •"Make or Buy" Criteria •Hardware/System Requirements •Product Costs •Product History •*Software News* Newsletter

Datapro Reports on Banking Automation

Designed specifically to provide banks and thrift companies with an authoritative information service about the unique automated systems that are so dynamically changing this business segment. A must for today's progressive banker. •Feature Reports •EFTS •Teller Terminals •Automated Tellers •MICR Equipment •Credit Authorization •Specialized Equipment •Applications Software •*BankNews* Newsletter



Datapro Reports on Retail Automation

Designed to provide buyers, planners, and manufacturers of POS/retail store systems with objective analyses of currently available products and services. This all new Datapro service features over 400 pages of detailed reports. •Integrated POS Systems •Electronic Cash Registers •Credit and Payment Systems •Specialized Equipment and Systems •Vendors •Applications •Software •*RetailNews* Newsletter

Special offer: no purchase obligation

Under Datapro's unique Trial Subscription Plan, you can try any one of the above information services in your office for 30 days with no purchase obligation. As a Trial Subscriber, you'll enjoy all the privileges of a regular subscriber.

You'll receive: •The looseleaf volumes •Monthly updates to the volumes •Monthly newsletters •Unlimited inquiry service. For details on this Trial Subscription Plan, write to Datapro today. Or, for faster service, call Bob Mervine at 609-764-0100.

For those who value information.
datapro
Datapro Research Corporation
1805 Underwood Blvd. □ Delran, NJ 08075 □ 609/764/0100 □ A McGraw-Hill Company

What Would You Have Done?

The following two scenorios were omong those studied by participonts of the Computer Science and Technology Ethics Workshop held recently in Menlo Pork, Colif., by the American Federotion of Informotion Processing Societies and orgonized by the Stonford Research Institute.

To indicote whether you feel the parties involved behoved ethicolly, fill in the form included ond return it to Computerworld *in the postpaid envelope included in this issue. Write "Ethics" on the outside of the envelope.*

Scenario A

A computer programmer working for a state department of health assisted in the development of an application system. The system had few controls over access by unauthorized persons and no monitoring or logging of access was performed. Data consisted of medical information on identifiable people.

The state had no laws controlling confidentiality of the medical data. However, the department had rules governing confidentiality and prohibited employees from accessing the system without authorization and from taking copies of data, but little was done to enforce them or monitor for violations.

The programmer felt the system did not adequately enforce the rules of confidentiality and resulted in increased and dangerous exposure of the data. He brought this to the attention of his immediate manager and finally higher management, but with no success. He was finally threatened with sanctions if he did not stop his efforts.

He violated the rules of confidentiality and easily obtained a copy of the data from the system consisting of medical information about himself. He presented the copy of data to a state legislator who revealed this action and the data with the programmer's permission to a legislative committee in a public hearing, and it was widely publicized in newspapers.

This caused great embarrassment to the agency, and the programmer was fired from his job.

Scenario B

The manager of a computer applications programming department in a large company is responsible for all applications programming throughout the company. Most of the programmers report to him. Several people in other departments also program, but must conform to the standards in the programming department.

All application programs to be run on a continuing production basis must be tested and approved by the quality assurance group in his department before they go into regular production use.

The top executive officers of the company are engaged in a massive fraud against the stockholders and other investors by inflating company assets. Significant evidence of the fraud is contained in the data files stored and processed by the computer. Several programs have been developed to assist in the fraud.

A programmer in the inventory control department and a programmer in the applications programming department are knowing participants in the fraud. The programs used in the fraud perform unorthodox functions that obviously don't contribute to legitimate functions.

For example, one program generates new records of nonexistent inventory items by copying and slightly modifying records of existing items.

Such programs have passed quality assurance testing on the pretext that they will be used to generate test master files for use in business simulations for the planning department. When the programs were released to the computer operations department for production, they were actually used to modify the master files.

The programming manager was unaware of the involvement of the programmers. The fraud-related programs were not suspicious to him.

Several programmers reported to him that unexplained, unusual activities were going on in several parts of the company. He was aware of severe financial problems and was told to do only what he was asked to do without question and not bother about the implications.

The fraud was ultimately discovered and the perpetrators prosecuted. The programming manager was identified as an unindicted coconspirator.

– – –

Scenario A – Programmer
Ethical___Unethical___No Ethics Issue ___
Ethical Judgment: ______________________________

____

____

____

Scenario B – Programmers
Ethical___Unethical___No Ethics Issue ___
Ethical Judgment: ______________________________

____

____

____

Scenario B – Manager
Ethical___Unethical___No Ethics Issue ___
Ethical Judgment: ______________________________

____

____

____

Bayh Named to Chair Combined Senate Unit

WASHINGTON, D.C. — The Senate Judiciary Committee has combined its subcommittees on Constitutional Rights and Constitutional Amendments and chosen Sen. Birch Bayh (D-Ind.) to chair the new body.

The combined subcommittee will be called the Senate Subcommittee on Constitutional Amendments and Rights.

Bayh replaced Sen. John Tunney (D-Calif.), who took over as chairman of the privacy-minded Constitutional Rights Subcommittee after Sen. Sam J. Ervin Jr. retired from Congress in 1975. Tunney brought two issues, government intelligence gathering and criminal justice information systems, to the subcommittee's attention before his election defeat last fall.

Already the chairman of the Subcommittee on Constitutional Amendments, Bayh seemed "the logical choice to head the reorganized subcommittee," a spokeswoman for the senator's office said. He has chaired the Amendments Subcommittee since 1963.

Bayh has consistently favored various forms of privacy legislation — from the Privacy Act of 1974 to the Percy-Goldwater amendment banning unrestricted use of the Social Security number as a universal identifier and Sen. James L. Buckley's amendment providing for the confidentiality of school records, the spokeswoman said.

During the 94th Congress, Bayh sponsored legislation designed to limit the use of polygraph tests, she added.

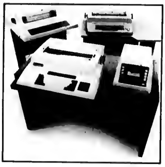
The subcommittee's membership has yet to be chosen.

Murch to Speak at NCC

DALLAS — A. Douglas Murch, senior vice-president of the Prudential Insurance Co. of America, will speak at the National Computer Conference (NCC) here Wednesday, June 15.

Murch will be featured at a plenary session on data processing in the insurance field to be held at 1 p.m. in the Dallas Convention Center.

When we plant a terminal...



It gets as much TLC as Marilyn gives her potted Spathiphyllum.

Terminals are just as sensitive as plants so it's important to pick the right one for *your* job. That's why Trendata offers a wide range of printing terminals and magnetic tape recorders to fit any number of applications.

And since terminal productivity stems from proper training, Trendata field reps make sure your people understand all the do's and don'ts of terminal operations.

Should maintenance problems arise, they are immediately pruned out by our own nationwide service people. The last thing you need is a terminal withering on the line.

As we mentioned, anything that grows needs TLC . . . and if your system isn't getting Terminal Loving Care, we'd like to cultivate a little conversation.

trendata
610 Palomar Ave., P.O. Box 5060,
Sunnyvale, CA 94086 (408) 732-1790
AN APPLIED MAGNETICS COMPANY

EDUCOM

Spring Seminars 1977

This year, in place of a single spring conference, EDUCOM is offering one-day seminars on specific topics. Scheduled in regional locations to minimize travel expenses for participants, each seminar will be limited to less than 30 people. Approximately one half of the seminar will consist of a tutorial presentation by the seminar leader; the remainder will be devoted to group discussion.

Pricing Computer Services
Dan Barnard
Sr. Consultant, EDUCOM
San Francisco 3/24
Atlanta 3/31
Philadelphia 4/14

Departmental Computer
Kenneth Bowles
Director, Inst. for Infor. Systems
University of California, San Diego
San Diego 4/12
Boston 4/27
Philadelphia 4/29

Electronic Mail
David C. Brown
Assistant to the Director, MACC
University of Wisconsin-Madison
Einar Stafferud
President, Network Mgmt. Assoc.
San Francisco 3/22
Atlanta 4/1
Madison 4/13

User Services
Ronald Code
Asst. Mgr. User Services, SCIP
San Francisco 3/23
Philadelphia 4/13
Madison 4/14
Boston 4/28

Introduction to MIS
James C. Emery
President, EDUCOM
Atlanta 3/29
San Diego 4/14

Word Processing
Howard Morgan
Professor, Wharton School
University of Pennsylvania
Atlanta 3/30
San Diego 4/13
Philadelphia 4/28

Pricing Computer-based Library Services
Paulina Atherton
Professor, School of Infor. Studies
Syracuse University
Bruce Briggs
Assoc. Dir., Campus Computing Network
University of California, Los Angeles
San Francisco 3/25
Philadelphia 4/27

For a descrptive announcement and registration form, please telephone EDUCOM: (609) 921-7575.

Consider Various Scenarios

Workshop Attendees Ponder Question of Ethics in DP

By Molly Upton
Of the CW Staff

MENLO PARK, Calif. — Should a DPer "blow the whistle" on a project he thinks is poorly conceived and/or contrary to the public interest?

Should data be used without permission for a purpose other than the one for which it was originally intended?

Both the above situations embody ethical issues and are extrapolations of two of the 52 scenarios considered by attendees at a recent Computer Science and Technology Ethics Workshop. The meeting, sponsored by the American Federation of Information Processing Societies (Afips), was held here recently at the Stanford Research Institute under the direction of Donn B. Parker.

The National Science Foundation provided funding for the workshop, which drew over 30 participants from a variety of disciplines including philosophy and law as well as DP.

Public Discussion Necessary

Parker emphasized the need for public exposure of issues prior to the formulation of codes of ethics. Although various DP societies already have ethics codes, Parker said writing codes before much public discussion is putting the cart before the horse.

The conference was designed to generate observations which will become a report distributed by Afips Press, he said.

One of the prime audiences for the report should be educational institutions, according to Richard Waller of the British Computer Society. The report may also aid in drafting legislation in DP areas not adequately covered by existing law, another participant suggested.

Eventually the material may be distilled to produce principles such as those for a proprietary program unless specified otherwise, Parker said.

The scenarios fell into seven categories, as analyzed by some participants. These included conflict over obligations or implicit contractual agreements; disputed rights to an intellectual product; questions of the confidentiality of sensitive data or invasion of privacy; and conflicts between personal morality, professional ethics and organizational loyalty.

Other categories were responsibility for both direct and indirect social effects of computer applications; responsibility for influencing public opinion; and questions about the validity of computer tools in social and political decision making.

Why the need for awareness of ethical issues? DP technology is developing at a rate that outstrips legislation, one participant observed.

The DP community should increase its efforts to promote ethical considerations and help draft legislation that pertains to DP situations before Congress takes over the job, other participants suggested.

To illustrate the lack of ethical principles, several participants were surprised to find that in two similar scenarios, one in the gambling area and one in business, they ascribed weight to the gambling code of ethics and found themselves searching for the applicable ethical consideration in the business situation.

In many instances, laws are inadequate, participants realized as they grappled with the issues presented.

Just as medical experts realized the definition of death was inadequate after new techniques could keep hearts beating long after other parts of the body were essentially dead, so has the computer community recognized that DP technology has introduced numerous situations where the law is inadequate, Charles Reagan of the University of Kansas observed.

Test your own ethics on Page 8.

Key Question

One key question commonly considered was whether ethics should be consistent with the law or ask more of an individual than the law. "The law represents minimum morality," one lawyer contended.

Attorney Susan Nycum said law is essentially unsettled in much of the DP domain, especially in instances involving intellectual property such as computer programs.

In other instances the law is settled, but cannot be easily applied to computing, such as in unauthorized retrieval of data from remote sites, she said.

William Fenwick, another attorney, noted the current disagreement over sales taxes applied to software.

Joe Overton, legislative aide to Rep. Barry Goldwater Jr., observed there is no constitutional concept covering the relationship between an individual and the data collected about him.

Issue of Quantity

Another issue to which ethics, if not laws, may need to be applied involves the quantity in which data is easily obtained.

Although laws state certain personal information is public record, should the same apply when one can inexpensively and quickly acquire much larger volumes of that same type of information? the attendees asked.

Participants at the conference represented fields such as philosophy, corporate and academic DP, law, consulting, DP technology, government, psychology, accounting and journalism, Parker said.

Speech Experts Use DP to Write Rhetoric Echoing Voters' Views

By Ann Dooley
Of the CW Staff

PEORIA, Ill. — Politicians will be able to win elections before long by using a computer to analyze the subgroups within their constituencies and tailor their political rhetoric to match, according to two speech experts.

Dr. Donald C. Shields of the University of Missouri at St. Louis and Dr. John Cragan of the University of Illinois claim to have proved this during last year's Presidential campaign.

During the primaries, Cragan and Shields became interested in writing a speech that would "play in Peoria" — that is, appeal to "Middle America."

And they did exactly that. They tested a cross-section of Peoria citizens on 20 issues relating to foreign policy. The respondents ranked actual foreign policy statements taken from newspapers according to how they reflected their views, Cragan explained.

The statements were loosely classified into three views of American foreign policy. One view represented the "Cold War warrior" typified by Ronald Reagan, the second was a neo-isolationist view represented by Sen. Eugene McCarthy and the third was a balance of power stance portrayed by Henry Kissinger, according to Cragan.

Besides finding out citizens' views on foreign policy, the survey also determined the most effective style and specific phrases in which the respondent liked to hear his opinions expressed.

DP-Written Speech

The ranked statements were keypunched on cards and entered into an IBM 370/145 at the University of Illinois here. Through factor analysis and linear equation programs, the computer wrote a seven- to nine-minute speech that "would please the most and offend the least" number of people, he said.

An example from their all-American speech goes: "The People's Republic of China is a sovereign state, but we must not forget to support our ally, the Republic of China on Taiwan. I believe both governments can learn to live with the reality of each other."

"It's a bland speech; no one's going to march down the road with you," Cragan said. But when the speech was presented before a Peoria audience, it received an ovation.

Nothing Controversial

Since the speech says nothing controversial, it will help to avoid the "big error," such as the one former President Ford made in reference to Poland during the second Presidential debate, Cragan said.

"We used essentially the same process that speechwriters use, although they are not as scientific," he said. "In the last campaign, it was referred to as flip-flopping."

"With the message and language pretested, we know exactly what to say and how to say it," Shields added. "The only factor left out of our system is a good delivery by the candidate."

Computerized speech making would be a good system if the politicians wanted to mirror their electorate, but it wouldn't be very good on a leadership level, Cragan said. He feels the use of computers in political campaigns should be closely examined.

"We called up some local politicians just to see what they would say about it. They denied any interest in such a technique, but the press should be aware of the questions to ask, anyway," he said.

Although the political response has been guarded, seven or eight marketing firms have shown interest in the technique, he added.

The professors conducted the research as purely objective if somewhat cynical observers and said they would be "available to advise" any interested political candidates.

XEROX

Just one of the many leading companies you'll see at

COMPUTER EXPO 77

Continuous demonstrations of the Xerox 1700 Communications Terminal. This terminal is designed for the interactive user with high-quality printing requirements. Features include the HyType II printing mechanism, up to 45 cps speed, and full ASCII character set and APL compatibility. Offered on 90 day, 1 year, 3 year leases and available for purchase.

Organized by:

COMPUTER CARAVAN 77

The national computer exposition that's coming to you.
797 Washington Street, Newton, MA 02160
(617) 965-5800.

San Francisco • Los Angeles • Cleveland • Minneapolis/St. Paul
Chicago • New York • Philadelpia • Washington, D.C. • Boston. Starts March 29th.

system/3 payroll?

Of course Wang has it, and fully supports it year-round, for FICA, for Federal, State and most city taxes, for labor reporting and for more than 100 standard reports, including EEO personnel reporting . . .

For more on System 3/Payroll call Joe Nestor at (617) 851-4111
Wang Laboratories, Inc., Lowell, Mass. 01851.

In California call Carl Tarascio at (714) 631-0138

WANG

CONSIDERING

TSO?
CMS?
CRJE?
ATMS?
VSPC?
ROSCOE?
WYLBUR?
SPM/OL?

TRY

MENTEXT!

☐ Please send more information on MENTEXT.
☐ Please contact me about your 15 day trial.

Name

Title

Company

Address

City

State Zip

( ) Ext.
Telephone

Send to: MENTEL, INC.,
459 Hamilton Avenue
Palo Alto, California 94302
415 321-2787

'Balanced, Responsible'

EFT Commission Head Pleased by Report

By Toni Wiseman
Of the CW Staff

The National Commission on Electronic Fund Transfers recently released an interim report of its findings and recommendations to the President and members of Congress [CW, Feb. 28]. In a recent interview, the commission's executive director, Jack Benton, looked back over the past months and discussed the commission's development and progress.

WASHINGTON, D.C. — The 26 commissioners of the National Commission on Electronic Fund Transfers (EFT) were very sensitive to the fact that when they were named, majority opinion held they would get nowhere because they knew nothing about DP and its technology.

But today that has changed, and most commissioners believe they have a real feeling for the dynamics of EFT, according to the commission's executive director, Jack Benton.

A major part of Benton's job has been to see that each commissioner got to the point where he knew exactly what was in question, he said.

Today, "if an issue brought up at a hearing is defeated, it's because the facts weren't there to support the view, not because the commission didn't understand the issue," Benton said in an interview here recently.

He had earlier admitted, however, that the commissioners' experience with terminals is "zilch" and "most still think [point of sale] is something Citibank invented."

Benton, who was appointed by former President Ford, came to the commission from TRW Electronics and previously worked for the Rand Corp. He is the only commission member with "hands-on" experience, he noted.

Benton doesn't feel the commission's work or its recommendations would have been different or would have benefited from its members having DP backgrounds, particularly since "every commissioner has a wealth of technical experience [from others in the industry] which he can draw on."

If the commissioners had been DP-oriented, it simply would have required 12 months of educating them in banking and government rather than DP, he commented, adding his opinion that technology is easier to teach in a short period than are finance and law.

Benton said he "feels extremely good" about the commission's interim report [CW, Feb. 28], which he described as "very balanced and very responsible."

"But not everyone is going to be happy with the recommendations," he conceded.

The recommendations in that report represent a blueprint for how EFT should develop in this country, effecting compromises which will be best for the country, he stated.

Maintaining "there is a very constructive sense of pragmatism to the [report's] recommendations," Benton said "every compromise was made to benefit the consumer."

He explained that "compromise" was not used in the derogatory sense; rather, the commission had taken into consideration the many points of view presented in hearings, and its judgment was somewhere in between. "It was a question of developing group wisdom, something we could believe in."

As an example of the evolution of "group thinking," Benton remarked the commission initially didn't think privacy was even an issue in EFT.

That has changed dramatically, he indicated, referring to the report's recommendations.

EFT is part of a bigger problem — much larger dynamics than many people are aware of, Benton suggested. It is more than a question of technology and how financial services are distributed today.

"EFT seems to touch on so many things that otherwise do not link anywhere in the chain of events; so it's a good thing to hang on to," he said.

"Without EFT, there would be no consideration of how data communications, for instance, touches on how depository institutions operate internally."

Benton emphasized that contrary to most commissions, this one won't be making recommendations and disappearing. Instead, it is now entering a very important part of its life cycle — the feedback period.

"Now is the time for individuals and vested interest groups to get back to us, to present new facts and arguments to be looked at," he said. "I rather suspect that in October we will make a restatement of all these issues, but the burden of proof is on those who think our recommendations should be changed."

Benton said he hopes the DP industry will not develop unrealistic expectations about what the commission will do about questions of competition with common carriers, standards and security.

"What you can expect from the commission is that if, indeed, there is a problem here directly related to EFT — such as the role of [AT&T's] Transaction Network Service vs. others — then the commission will make strong recommendations to Congress [in its final report] about dealing with these questions," he said.

Total Communications Approach Seen Mobilizing Future Offices

By John P. Hebert
Of the CW Staff

BOSTON — Retail store management will combat the problems of slow productivity gains and rising costs for people and paper by implementing data communications in a total systems approach, according to Michael Levokove, marketing manager for AT&T's Distribution Industries.

Electronics may eventually help displace the office as a stationary base of operations, Levokove said. If it does, it will have as dramatic an impact as the telephone did 100 years ago, the keynote speaker told attendees of the National Retail Merchants Association's Seventh Annual Telecommunications Seminar here recently.

In "Office Communications of the Future," Levokove envisions a drastically different "scenario" from today's typical environment.

The flexibility of data communications as part of a total systems approach will afford management the freedom to work from a place other than the central office site, Levokove said.

The office of 1985 to 1990 will have no secretaries. Instead, there will be "administrative managers" who will be specialists in the fields of management, information storage and word processing, working from scattered administrative support centers, Levokove predicted.

The use of CRTs or other visual display terminals will be an integral aspect of this scenario because they will allow the specialists to interact with a company's computer and information storage devices, he said.

The terminals will double as calculators and as parts of conferencing systems to promote more frequent management meetings. This may be feasible late in this decade or in the early 1980s, he predicted.

Levokove admitted the future office setting may not look exactly like the one he depicted, but maintained there would be a different concept in the division of labor than there is today.

Although the manufacturing arena has enjoyed an 83% increase in productivity in the last 10 years, the office environment has produced a mere 4% increase in productivity while expenses have doubled, he said, citing a recent Stanford Research Institute study.

Additional statistics from the study showed 70% of office costs are absorbed by people, with executives accounting for the major portion.

Electronic communications provides the means for tying all of these things together, he added, noting that the total systems approach must consider the user. The user will look to vendors for modular, flexible systems to make him more efficient.

The move toward data communications and electronic storage "makes a lot of sense" because now 35% of the paper information in a company's files is never accessed and 90% can be discarded after one year, he said.

This New Infopac™ Obsoletes Portable Data Entry Terminals Using Tape Cassettes

Such as those offered by MSI, Norand, Telxon and others. Unlike these, *Infopac* has a *self-contained* solid-state memory—which means no moving parts and thus high reliability.

Infopac can also be configured to be fully compatible with any of these other devices, and so can be used with existing systems with no changes required in hardware, software or interfacing. At long last, you have an alternate, second source of supply!

All fully described in our literature, and yours for the asking.

INFOPAC™

AzurData Incorporated
1305 Mansfield Ave., Richland, WA 99352
(509) 946-5161

Offices and Representatives
in Principal U.S. Cities, and Overseas

Study Finds DP Budgets Up Average 10.2% This Year

By Ann Dooley
Of the CW Staff

MENLO PARK, Calif.— Large organizations will increase their 1977 DP budgets an average 10.2% over 1976 figures, according to a survey by Input, a consulting firm here.

DP budgets in the process manufacturing, banking and utilities sectors will grow 12% while increases in the retail sector will reach only 6%, the survey forecast.

About 50% of the organizations surveyed are installing or expanding on-line capacity with long-term plans for distributed DP.

The most dramatic increase in equipment purchases will be for terminals, data communications equipment and secondary processors, according to the survey, which concentrated on the top 800 companies listed in Fortune 500 and also covered the federal government and large state and local governments.

Outside Service Expenditures

Expenditures for outside services will continue to grow at a rate of 16% for the current year, Input found.

The banking industry, the heaviest user of outside services, will spend 27% of its DP budget on such services while the insurance industry spends 19.2%, the utility industry spends 15.7% and diversified financial firms spend 13.5%, according to the survey.

Industries in which salaries are low, such as banking and insurance, must rely on outside services to supplement their in-house capabilities, Input explained.

Federal agencies proved to be the largest per-unit spenders on outside services, spending 21.8%.

In the case of the federal government, outside services allow agencies to perform the required processing without exceeding their fiscal year budgets, Input said. Such services also allow agencies to avoid the lengthy justification and approval procedures required to obtain their own computers.

The largest budget increases will be in the financial and government sectors, according to the survey.

Remote computing services and software products are the fastest growing types of service-oriented organizations, while batch processing and educational services are the slowest, the survey said.

Growth Expected to Slow

Next year's budget growth is expected to slow and level off to 9% over all the sectors, according to the survey.

DP expenditures in the process manufacturing sector, led by the petroleum industry, will continue to expand 12% in this time frame, while retail businesses' budgets will just keep up with inflation, the survey said.

The ratio of DP expenditures to revenues shows that airlines, included in the transportation sector, tend to use computers more extensively than any other industry because of their on-line reservation requirements, according to the survey.

The discrete and process manufacturing sectors are the biggest spenders based on per-company expenditures. The main reason for this is the widespread and growing use of computers for production and inventory control and computerized process control as well as for administrative applications.

Another reason for the large expenditures is the industries' need to link separate facilities to integrate data.

The study concluded that half the surveyed firms are interested in installing distributed processing systems ranging from secondary processors in remote locations to multiapplication intelligent terminals.

It also concluded that DP activity is not always centrally coordinated and minicomputer systems are purchased locally to solve single applications without regard to an overall DP strategy.

Programs Too Difficult

As for software to operate these systems, users are generally unhappy with IBM's network and data base management systems because the programs are difficult to learn, implement and maintain, according to the survey.

The survey suggested users are looking for vendors who can develop programs that are more efficient and easier to use.

Users are also interested in service firms that emphasize software and system designs which facilitate data gathering and analysis from remote data bases, the report said.

Survey Sectors

The survey broke the user sectors into life insurance, banking, retailing, discrete and process manufacturing and diversified financial — including brokerage, finance, savings and loan companies and nonlife insurance companies.

Discrete manufacturing includes shipbuilding, apparel, printing and publishing, electronics and furniture among others.

Process manufacturing encompasses petroleum refining, mining, textiles, chemicals, food, tobacco and others.

Other sectors included transportation, utilities, nonsecure functions of the federal government and state and local governments of the 15 largest states and five largest cities in terms of budget.

This survey population was selected because it controls over 60% of all DP spending and tends to take the lead in trying new products, systems and technologies, Input explained.

These large organizations also tend to be less affected by short-term economic changes and events than do smaller organizations.

DP Managers Interviewed

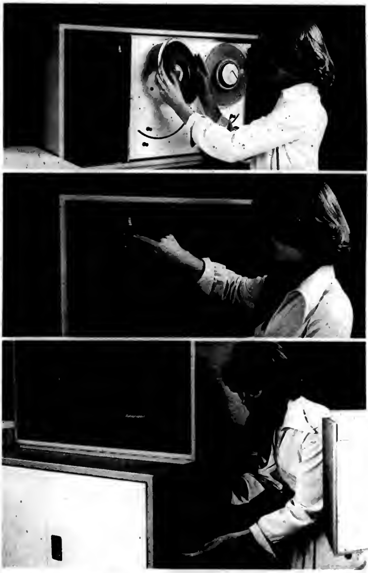
Data was obtained from direct interviews with DP managers. A smaller number of financial executives also were interviewed to obtain some perspectives on how top management perceives its company's DP facilities and expenditures.

In addition to finance and budget questions, the interview included questions dealing with operational plans and problems.

The DP expenditure items in the survey included an overall range of DP products and services. Expenditure changes were computed by averaging the responses and, using the Fortune 500 list bases, extrapolating to account for the entire industry.

In some industries, where no real norm could be established or where the data seemed deficient, some judgment about the relative changes of individual budget items was applied.

A copy of the survey is available for $2,500 from Michael P. Burwen at Input, 2180 Sand Hill Road, Menlo Park, Calif. 94025.



AutoCOM.™
A computer output microfilm system that's simple enough to use in-house.

And at $1600 per month, AutoCOM is easy enough to afford.

In-house computer output microfilm used to be a complicated, expensive operation. But now there's the AutoCOM System from DatagraphiX, the world leader in COM. AutoCOM gives you cut, dry archival quality microfiche with push-button simplicity. No complicated installation. No special training. No messy film processing.

And no major expense. For $1600*a month, you get the fully self-contained in-house AutoCOM System, the companion AutoFICHE duplicator, regular maintenance and complete systems support. Compare that to the way you're getting the job done now, then use the coupon for more details on AutoCOM.

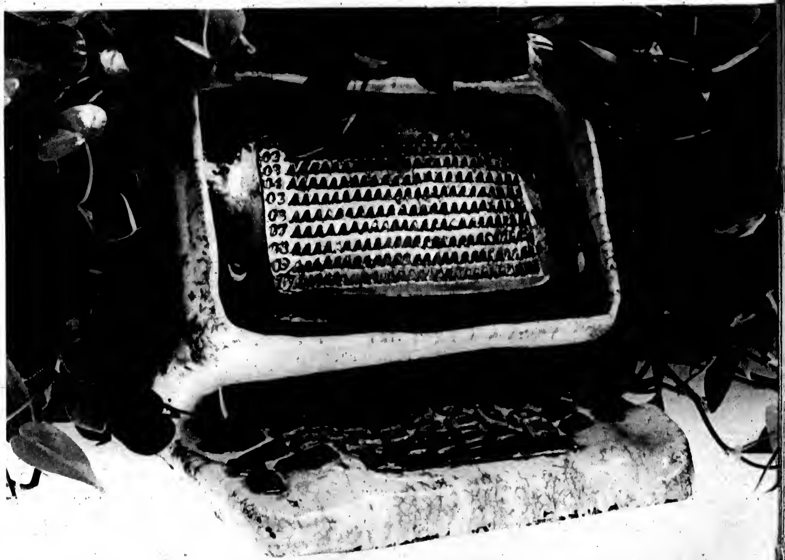
DatagraphiX®

*Based on standard 5-year lease terms and conditions subject to change without notice

DatagraphiX, Inc.;
a General Dynamics subsidiary,
P.O. Box 82449, Dept. C,
San Diego, CA 92138,
Phone (714) 291-9960

Please send me details on in-house COM with AutoCOM

Name ____________
Title ____________
Company ____________
Address ____________
City ____________ State ____________
Zip ____________ Phone ____________



You're outgrowing your 3270. Now what?

Things really bloomed when you first put your 3270 on line.

But now your system's growing like a jungle.

Your phone lines or your mainframe go down…so your 3270 just sits idle.

And when everything is working, your lines jam up and your mainframe bogs down…so your 3270 works a lot more slowly than you'd expect.

Errors keep cropping up,
3270 can't weed them ou

And you'd like to kee
base at your termin
can't handle th

Solution? A
Sanders 8

The S
comp
it

distributing the processing…without wiping out your software investment.

When your phone lines are clogged or down, Sanders Queued Transaction Handling stores your data locally until your mainframe becomes available.

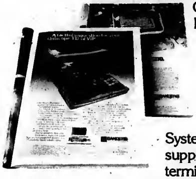
Operator errors? Sanders Local Validation and Arithmetics catch
erro
rs Local File Reference lets you see names or descriptions whenever you enter an account number.

Sanders Local Format Storage speeds up your operation by eliminating the transmission of lengthy formats.

Sanders Automated Keystrokes
you multi-key entry fr
depression.

-4813 •
• Louisiana
• New Jersey (201) 636-0722

WE HAVE A NEW NAME



On January 28, Harris Corporation acquired Sanders Data Systems.

This is significant for us. And for you.

Sanders Data Systems is a leading supplier of intelligent terminals for interactive and distributed processing networks. Harris Corporation's Data Communications Division, on the other hand, is a leader in remote job entry terminals, front-end controllers, and remote communication processors.

Together, we represent a long-term commitment to the data processing industry by a half-billion-dollar company known throughout the world for quality, high-technology equipment and services.

And we plan to be on the leading edge during one of the most innovative, exciting, and productive periods that data processing has ever seen.

But what about now? What about you?

Suppose you've bought—or are thinking of buying—Sanders Data Systems terminals? You can expect the same reliable, serviceable products as before. With the same no-risk migration to greater performance and flexibility. With the same responsive, effective field support. And with the financial and technological resources of Harris.

Now, you'll be supported by one of the leading terminal companies in the computer industry.

Harris Corporation, Data Communications Division, P.O. Box 1408, Nashua, NH 03061. (603) 885-6685.

Editorials

A Realistic Method

After two years of study, the National Commission on New Technological Uses of Copyrighted Works (Contu) appears to be on the verge of recommending copyright protection for computer programs and data bases [CW, March 14].

This is clearly the best direction to take and the commission is to be congratulated for making this stand in face of proponents of patenting for computer software or for some entirely new scheme to protect programs.

Copyrights, if treated seriously by the courts, can supply a fair measure of protection for computer programs, without stifling the dissemination of such programs as patent protection could.

In addition, copyrights are relatively easy and inexpensive to obtain, unlike patents which are difficult and expensive to get, at best.

Patents would only provide protection to those few programs that can claim to be both unique and nonobvious, while copyright protection will apply to a much larger body of software currently in use.

Other proposals for an entirely new registration system for computer software that is somewhere between copyrights and patents do have some merit. But they would set up a new bureaucracy and be more expensive to maintain than the current copyright system.

Proponents of both patenting and a new system should accept what now appears to be the inevitable — copyright protection, and only copyright protection, for computer software.

It is clear that copyrights may not be the "best" or "ideal" way to provide software protection. But at the same time, it is equally clear that copyrights are the most realistic, achievable method of providing that protection and should be supported for that reason.

All parties interested in the question — software producers and users alike — should now direct their efforts to finding ways to most successfully use the copyright system for software protection.

In Limbo

While the Federal Communications Commission revises its amendments to its proposed rules defining the boundary between computers and communications, Congress is rewriting the Communications Act of 1934.

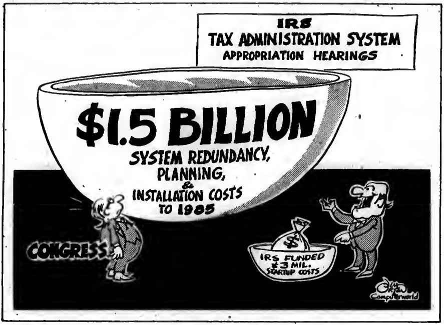
Meanwhile, little is being done to streamline the day-to-day regulatory environment. The major issues take too long to resolve and, when decisions are reached, the fast-moving area of telecommunications often has moved to another problem plateau.

It is somewhat silly to worry about an exact definition of computers and communications when there may be none. It is further absurd to try to assign certain roles and functions to specific types of terminals so they can be fitted into nice little slots.

There may be no boundary between computers and communications and it is unlikely that a congressional subcommittee would in any way lessen the bureaucratic machinery that now grinds on ever so slowly.

What users really need are some expedited decisions that will allow them to utilize their equipment and optimize their networks with a minimum of regulatory procedures.

That is the real message that users are transmitting to Washington. But the message is not getting through.



'To Minimize the Risk of Our Own Investment, We'll Need a Bit More From You Folks .'

Letters to the Editor

IRS Says TAS Plans Not Hidden, But Disclosed Since March 1974

The editorial titled "Taxing the System" [CW, Feb. 28] implied the Internal Revenue Service (IRS) was not fully disclosing its plans for a redesigned DP system and called for publication of a draft report by the Office of Technology Assessment (OTA) on the proposed redesign.

While we share your opinion regarding the importance of full disclosure of plans like ours, we are concerned about certain statements in your editorial.

Of primary concern is the implication that information on plans for the proposed Tax Administration System (TAS) has been withheld. In fact, the opposite is true.

Presentations of TAS plans within and outside of government have been extensive, beginning with an introduction to the system's concepts in March 1974 for approximately 100 persons in the DP community.

As system details developed, further discussions and formal presentations were given — the most recent in September 1976, with issuance of the 1,000-page TAS working document.

Representatives from 55 computer firms attended this briefing and 40 others, who were unable to attend, were sent the TAS material.

The Department of the Treasury and the Office of Management and Budget have also carefully considered the system's design from technical and budgetary standpoints.

The General Accounting Office (GAO) conducted thorough studies and issued two reports — one dealing with safeguarding taxpayer data, the other with costs and benefits. Although recommendations for improvements were made, GAO's overall conclusions supported the TAS effort by stating it was economically desirable and could provide a high level of protection to taxpayer data.

Over the past nine months, background material on the TAS plans, including the TAS working document, has been provided to appropriate congressional staffs.

A briefing was given to each house of Congress during last year's appropriations process, and another briefing is planned again early this spring.

Patrick J. Ruttle
Assistant Commissioner
Data Services

Internal Revenue Service
Washington, D.C.

Data Past

Five Years Ago
March 22, 1972

BOSTON — The Federal District Court here was asked to rule that the Federal Bureau of Investigation's (FBI) maintenance and dissemination of incomplete or inaccurate criminal identification records violated the Constitution.

The suit was filed by Paul Cowan, who claimed he lost has job through false records contained in the FBI's data bank of criminal identifications.

— — —

DENVER — The 10th Circuit Court of Appeals here ruled that a company is responsible for the actions of its computer system and must live by those actions.

During the suit, State Farm Mutual Automobile Insurance Co. said it was not liable in the case of a fatal accident because the insurance policy had been cancelled although mistakenly renewed by the firm's computer system.

The judge ruled against this "DP error" defense, stating that errors and oversights of State Farm's human agents and employees were to blame.

Eight Years Ago
March 26, 1969

WASHINGTON, D.C. — The Association of Independent Software Companies declared that neither copyrights nor a proposed registration system would properly protect software inventions.

Under a registration system, as proposed by IBM, actual programs would be protected, but the concepts behind them would not be.

— — —

MINNEAPOLIS — One of the first installations of the $2/mo telephone data access interfaces was made here by Northwestern Bell. It was being used by Computer Terminals, Inc. to test various modems and terminals.

People Come Before Machines

The following is in response to the editorial titled "Remember and Reassess" [CW, Feb. 14]:

While American Airlines has always considered machinery important to the operation of an airline, it has never thought the machine to be more important than the man or woman who operates it.

Beryl Simpson's viewpoint of Sabre, as expressed in Studs Terkel's book *Working* [CW, Feb. 14], is only one opinion and it does not fully represent the views of the airline's other reservations agents.

We're a people business and the individual comes first, whether it be the employee or the customer. In an increasingly competitive service industry, it is the individual who makes the difference.

This idea is perhaps better expressed by Daniel F. Murphy, vice-president of Passenger Services for the airline, who recently said: "We're a people business — people serving people — and, in the end, it's the human element, our own individual commitment to service that makes the biggest difference of all."

Kathleen Saluk
Public Relations Representative

American Airlines
New York, N.Y.

Distributed Processing No Exception

New Technologies Still Stymied by End-User Fears

By Jack Stone
Special to Computerworld

So now it is "distributed processing" that has the industry buzzing.

The young'uns see it as the onslaught of a dynamic new technology. But us oldsters — five or more years in the business — view it as a more intensive version of the traumatic fixation we suffered when we installed our last on-line, real-time, terminal-oriented, communicating, large-scale, centralized data base system (did I miss any of the buzzwords?).

Well, it may not seem so, but we — and I mean all of us — have come a long way over the years. Yet we — and again I mean all of us — have a long, long way to go.

To illustrate DPers' progress at installing complex systems, I interviewed Carole Crist, DP manager at the Springfield, Ohio, plant of Olan Mills, Inc., who is heading up a major part of her company's effort to move in the direction of distributed processing.

Olan Mills already has terminals feeding into minis at two of its plants and an IBM 370/145 in its corporate offices. The current plan is to put terminals in a nubmer at other locations.

Q. Carole, what has been your history in the wonderful world of data processing?

A. I started in 1965 in operations, moved into an operations supervisor slot and then into my current position as DP Manager. I am currently responsible for systems and programming, operations and technical training at this plant site, and I have an installation support responsibility at other locations.

Q. What is the nature of your company's business?

A. We are portrait photographers and operate a number of studios in major cities in the country. Administrative services are provided to groups of studios from district offices. Regional plants serve to process photographs.

Q. And what role does DP play in your company's operations?

A. Since our studios deal directly with the public, DP provides important support in handling the logistics of our business. Our major concerns are general administration, sales order processing and production (that is, photo processing) control.

Q. What has been the history of the development of your DP capability?

A. I think our experience has been comparable to that of many organizations. Our manual systems were converted to computer-based systems during the past five years. We have evolved from batch-oriented through terminal-oriented and to distributed processing systems which are now planned for implementation.

Q. Well, from what I have seen and learned about distributed processing, you and your company are certainly in for a roller-conster installation experience.

There is no question the entire program will be extremely challenging, to say the least.

Q. I suppose configuring communicating networks with intelligent terminals and then making them all work properly is going to be a very tough problem.

The Human Connection

A. Actually, the hardware configuration may be the least of our problems. We've built some in-house expertise over the years, as well as good relations with reliable vendors. Naturally, we will conduct appropriate tests on the hardware before making significant purchases.

Q. I guess, then, that OS mods will occupy a lot of your programming talent, trying to customize vendor software to meet the unique needs of your organization.

A. We're fine in the OS department. Vendor software that we've seen looks quite comprehensive, reliable and properly supported.

Q. I assume the application development process has been a nightmare, trying to identify and meet the needs of a geographically dispersed user population.

A. Well, not really, no. You see, we in DP have come to know the company business rather well. We feel our designs will be effective and efficient for our user set since they represent reasonable evolutionary steps in the systems development process.

And, of course, pilot operations will uncover requirements for program modifications. Oh, we have not been without problems in the past, and we are certainly going to have programming problems in the future, but I feel that we have program development under control.

Q. Your project seems to have the technology well in hand. Is your management upset about cost overruns or schedule slippages or underutilization of hardware?

A. We are very fortunate with regard to management support. We in DP believe management has a reasonable understanding of what can be accomplished in a practical way and, therefore, it has been patient with our failures and laudatory of our successes.

Q. I'm afraid I'm a bit confused. You indicated earlier that the development is going to be very challenging, but I can't seem to find the big problem. You appear to have everything going right for you — hardware, software, applications, management. I would say your project is a piece of cake.

A. Did you ever try to train a production worker to correctly enter data into a computer terminal when that worker is afraid the terminal will eliminate his job?

Readers are invited to send inquiries and commentary on management and human relations in the DP setting to be answered in this column. Address letters to Stone, Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

'Golden Goose' Provisions

Contract Clauses Keep Site Up During Software Work

The Taylor Report
By
Alan Taylor, CDP

Unlike a factory which can be closed down by a strike for six months and then reopened with all of its value intact, a DP site cannot survive interruptions of service for long.

If files are not updated, input gathers and is not checked for accuracy while there is time to handle problems and cycle dates go unobserved, it is unlikely that things will go smoothly for a long time after the system is brought up again.

There are many ways a DP system can be brought down — the hardware can be unplugged, some of the software can be destroyed, the input can be polluted, for example.

Each particular situation has to be looked at separately, however. Previously in this column we have looked at the situation in the facilities management area. This week we'll take a look at what can reasonably be done to protect the DP operation in the software development area.

One way the potential user can protect himself is to write into the software development contract something known as "Golden Goose clauses." These clauses are essentially agreements that say that when there is a disagreement, the parties will not try to win their point by destroying whatever is being argued over.

Custom vs. Canned

A major sector of the DP community is engaged in developing software for others to use. Some of this software is custom software as opposed to canned software.

In custom software, the customer and the developer together work out specifications and delivery dates, sign a contract and then go on their merry way, each preparing for the day that the software will be brought into use.

The specifications will call out all sorts of things, such as "accurate computations," "capable of handling the workload within a normal business day," etc. The developer will expect the customer to change his way of working to accommodate the new software, produce appropriate input, have proper printed output forms available, train people in how to use the new output and see that an adequate staff is ready and able to handle the work involved while he and his experts prepare the software.

There are three basic situations which have to be guarded against in this situation:

- The software is not delivered.
- The software, when delivered, does not meet the customer's need.
- The software apparently meets the customer's need, but failures appear later.

Software Nondelivery

Software nondelivery rarely occurs completely, but more normally in some partial form. The customer starts to use the partially delivered software — and then the balance just doesn't arrive. The problem arises as to whether the customer can continue to use the software that has been delivered and to obtain the necessary maintenance for it from the developer.

Golden Goose clauses can protect the customer when data processing operations are clearly endangered. Typical Golden Goose clauses would provide for the right of the customer to use the software without accepting it by paying the developer an appropriate fee, perhaps even up to the full amount of the software contract.

This may appear to be unfair to the customer, but the developer has costs involved, too. Golden Goose clauses are designed to keep both parties cooperating so there is no way to expect their benefits to be one-sided.

Maintenance of the software is a ticklish area because the developer may simply not want to do it or may not be physically able to do it (staff loss, inadequate documentation, etc.). This is where the real nub of the problem lies.

In fact, maintenance of the software requires that the maintainer has access to more than the contract would normally provide to the user in the event of full software delivery.

This is the crucial area when considering software development contracts — how to get the developer to give up normally confidential material which has become essential to the continued operation of the customer's DP operation.

There are three major methods of doing this: Cash, confidentiality and benefit sharing. Cash is obvious. Confidentiality will probably mean disclosure of the software and other material supplied by the developer to the user will be restricted in some manner.

Benefit sharing, however, is unusual and arises from the nature of software. Take the case where access to the software designs has to be given to a second-contractor to keep a piece of faulty software running. And then suppose he finds some error and corrects it. Now the customer is all right.

But the original contractor may also be able to benefit from this development. It may help him with future contracts or with other customers. The correct or different version of the software would not have been found except for his cooperation in giving access to the material — so why not give him the benefit of knowing what improvements have been made? It may help — and it can't hurt.

Golden-Goose clauses covering faulty software delivery are similar in nature to those covering delivery failure. They provide for continued availability of the software as delivered, for its maintenance and, if necessary, improvement on a shared-benefit basis, in much the same way as described earlier.

Software failures that are discovered some time after original delivery are a major problem, in the nature of both hardware and software. Neither hardware nor software stays the same, and often software is tested on hardware which does not permit the specified volumes of input files to be processed.

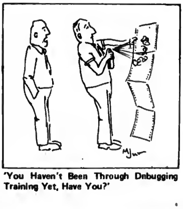
A possible approach to this area is the "time capsule approach." Copies of the documentation (perhaps on microfilm) are made at the time of delivery and, while not at that time made available to the customer, are available later if necessary.

The customer here obviously has to pay for the copying, but otherwise the situation is as in the software delivery failure case.

So there are some suggestions for Golden Goose clauses for the custom software areas. With failed delivery or immediately noted faulty delivery, customers have to use cash, confidentiality and shared benefits for their Golden Goose; latent failed specifications additionally need a time capsule provision. At least, these are my suggestions.

Yours may be different, and that is all right. What is not all right is failing to take into account the vulnerability of data processing and software at all and doing nothing to protect against the Golden Goose situation. That's sheer stupidity under the circumstances.

© Copyright 1977 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for non-commercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of *Computerworld*.



'You Haven't Been Through Debugging Training Yet, Have You?'

Reader Commentary

And Floppy vs. Flexible

Disc vs. Disk Controversy: One of Life's Small Wars

By J.D. Crawford
Special to Computerworld

The advent of the "diskette" not only revives one of life's small wars, but also promises to kindle a related, more vexing one.

The first involves the spelling of the name for a thin, flat, circular plate with a magnetic surface for storing information: disc vs. disk.

The second involves the term used to identify a particular type of such plate, specifically a non-rigid one: diskette vs. floppy disk vs. flexible disk.

Combining these spelling and term variations with the possible variations in capitalization and hyphenation can lead to confusion in user documents — unless we decide now which terms to use and how to spell them.

Evidently the Romans, in adapting the Greek alphabet for their use, created the K/C controversy. The root word is from the Greek *dikein*, to throw. From *dikein* came the Greek *diskos*, originally associated with the game of quoits.

The "k" in *diskos* is the Greek letter kappa and has the sound of our "k." The Greek form of kappa passed unchanged via the Etruscans to the Roman alphabet, in which it was rarely used.

Why? Because the Romans borrowed the Greek letter "gamma," changed its form to "c" and used it originally both for the sound "g" and "k."

Eventually they developed a graphic differentiation for the two sounds. They used the original form ("c") for the sound "k" and later also for other sounds such as "s" and "c" and developed a new modification for the sound "g."

Thus, Greek *diskos* became Latin *discus*. Since English borrows freely from both Greek and Latin, we often find ourselves in a K/C quandary. Sometimes we use them interchangeably, as in disc and disk. More often we're so indecisive that we play it safe and combine them, such as in pick, trick, lick and kick.

But disck? Not yet.

How have others resolved the disc/disk question? Well, from a layman's point of view, the *American Heritage Dictionary* defines "disc" as

> **disc.** *n.* Also **disk.** 1. *Informal.* A phonograph record. 2. Variant of **disk.**

and "disk" as:

> **disk.** *n.* Also **disk** . 1. Any thin, flat, circular plate. 2. Anything resembling such a plate, as an astronomical body or an anatomical structure. 3. *Botony* - - - - 4. Variant of **disc.**

Since variant spellings in this dictionary are introduced by the word "also," we can conclude the preferred spelling of the word for a phonograph record is "disc" and the preferred spelling of the word for any thin flat circular plate is "disk."

We might infer from this that "disc" (a phonograph record) connotes storage of information whereas "disk" does not. Therefore, those in the computer industry would prefer "disc."

A random check of various technical sources somewhat bears out this inference. That is, computer-oriented magazines, glossaries, standards and dictionaries evidently prefer "disc"; more general technological sources, including computer-oriented companies, prefer "disk."

"Diskette" is formed by combining the word "disk" with the suffix "ette," which can have one of three denotations: imitation, as in "leatherette"; feminine, as in "usherette"; or small, as in "kitchenette."

Obviously, here the suffix indicates small. Thus "diskette," considering only its elements, means "small disk." (This formation, of course, eliminates the c vs. k controversy because c followed by e usually takes the s sound, resulting in, phonetically, "dis sette.)

To IBM, however, "diskette" is more than just a "small disk." "The diskette consists of a small flexible disk and a semirigid protective plastic jacket in which the disk is permanently enclosed," according to IBM's *Product Reference Literature.*

Diskette is not a registered trademark. Both IBM and Innovex, Inc. introduced diskettes at about the same time in 1970. I don't know who coined the term. Innovex had at one time applied for registration, but has since abandoned this effort.

In any event, if the term "diskette" is used, it need not be capitalized nor credited to a trademark holder.

Floppy vs. Flexible

Floppy and flexible are not synonymous. Floppy means tending to flop, loose and flexible. Flexible means capable of being bent of flexed — plus the old standby connotation, "responsive to change."

Although journalists (and engineers) use the term "floppy" freely (with both disc and disk) in technical articles, manufacturers of disks and disk drives avoid the term in their technical literature.

Apparently, manufacturers are apprehensive about associating their products with the root word "flop" and its many connotations — which range from "to fail utterly" to "the sound that a pasty substance makes when it hits the wall."

The choice between "floppy" and "flexible," then, is purely a matter of taste.

Crawford is with systems technical marketing communications at the Foxboro Co. in Foxboro, Mass.

British Computer Consultants

Experienced programmers and analysts available for temporary assignments throughout the U.S.

We are a group of British software consulting firms deploying staff among many prominent U.S. corporations.

- IMS
- COBOL
- OS/VS
- PDP/11 & other minis
- BAL
- PL-1
- Telecommunications/Message-Switching

. . . and other support disciplines are available. You can now have immediate access to a new pool of superbly qualified computer professionals. Contact our U.S. representatives:

Starlex Systems & Service, Inc.

1860 Broadway, New York, N.Y. 10023
(212) 757-8703

155J Model 2
IBM Memory

Delivery July 1, 1977
$18,350/month
36-month lease.
Principals only.
Box

CW Box 4950
797 Washington Street
Newton, Mass. 02160

Analysts Who Parrot Vendor Claims Risk Being Discredited if System Fails

By Charles J. Pekarek
Special to Computerworld

I am concerned with that facet of the systems analyst's function in which he serves as a buffer between hardware and/or software salesmen and in-house, non-DP management. This service is impeded by what I call the "internalization problem."

Simply put, the internalization problem is this: It is basic to the nature of DP that tasks which were once manually performed have been put on the computer and are more or less automatically performed.

Hardware/software vendors deal in capabilities: "Just look at what Whizmo 70 will do for you!" Systems analysts must counter with irritating questions about the nature and structure of the product: On the bottom line, what is Whizmo 70? How is it constructed?

Answers to such questions will allow the analyst to determine the product's utility, feasibility and adaptability.

The analyst who forgets where his paycheck comes from and turns into a simple extension of whatever salesperson who comes through his office door is asking for (and richly deserves) trouble.

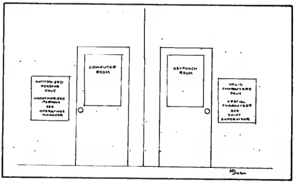
While this kind of parroting can be successful in the short run — non-DP managers can't call the bluff since they don't speak the language — when a new system proves to be a hopeless washout or when an old system is allowed to linger long past its utility, then it becomes clear to what degree the systems analyst has not been doing his job.

He will then be allowed to continue not doing his job, but without pay.

As the internalization process continues to relieve human beings of tedious, boring and repetitive tasks, it sets up the analyst as a cataloger of technology. There now exist a great many hardware/software combinations to do just about any job.

Some of these combinations aren't good for anybody. Some might be perfect for the company next door. Some might even be right for your company. The analyst must know how they do whatever they do before he knows whether he really wants them to do it.

Pekarek is with systems and planning at the J.E. Baker Co. in York, Pa.


AUTHORIZED PERSONS ONLY
UNAUTHORIZED PERSONS SEE OPERATIONS MANAGER
COMPUTER ROOM
KEYPUNCH ROOM
VALID CHARACTERS ONLY
SPECIAL CHARACTERS SEE SHIFT SUPERVISOR
MJ

MISSISSIPPI STATE CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by the CDPA, 508 Robert E. Lee Bldg., Jackson, MS 39201, up until 2:00 p.m. 4-11-77 for the following data processing equipment:

Request for Proposal No. 289 for the purchase of property insurance for state owned computer systems.

Request for Proposal No. 290 for the lease or purchase of a computer based process control system that will control the demand and consumption of electrical energy for the University of Southern Mississippi.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Clyde P. Ballard, Executive Director
Central Data Processing Authority

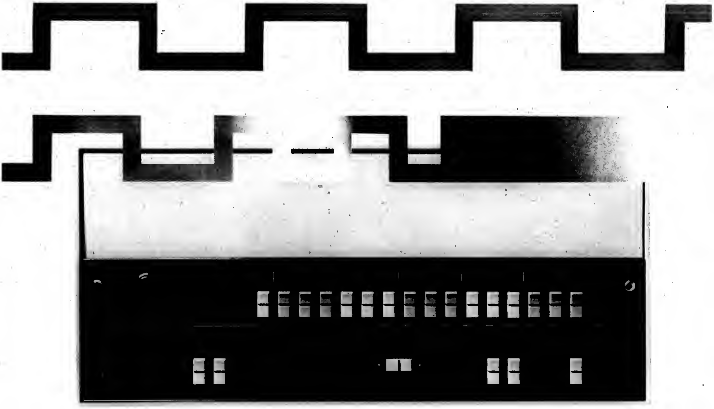
INNOVATIONS FROM HEWLETT-PACKARD

COMPUTER ADVANCES

Customers demand the increased performance benefits of new technology without losing the software investment made through the years. Then, computer purchases are ongoing investments and not a series of capital losses. As the advances of technology are inevitable, the engineers at Hewlett-Packard believe in products capable of taking advantage of technology as it becomes available. This fundamental view plans for technology and not for obsolescence.

Since the introduction in 1971 of the first 21XX Series family member, the 2100, the infusion of new technologies has permitted the family to average a 30% yearly price decrease. By 1974 and the introduction of the 21MX, the family instruction set had been dramatically expanded to take advantage of the new technology of microprogramming. The price and reliability benefits of the new semiconductor memory were also made available. New peripherals were added,

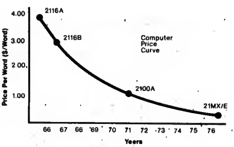
NEW VMT PROCESSOR INCREASES PERFORMANCE 70% TO 100%



for example those using the latest high-density disc technology. All the while, easy and compatible upgrade paths were available to HP's long-term, committed customers.

This history continues with the newest processor—the 21MX E-Series. The X-E is a more powerful implementation of the proven 21XX architecture. Through a combination of updated technologies and design innovations, the 21MX E-Series achieves a 70%-100% performance increase over the 21MX.

TECHNOLOGY DRIVES PRICES DOWN, DOWN, DOWN...



MODERN TECHNOLOGY

The E-Series takes full advantage of the latest developments in technology to provide maximum performance, yet maintains a high standard of reliability. The E-Series uses the latest MSI technology, Schottky TTL IC's, and fast 4K RAM memory to implement the 21XX family architecture. For performance, fast Schottky IC's are used on critical data paths; for reliability and economy, low-power Schottky IC's are used where speed is not critical. The result is a state-of-the-art implementation of the 21MX architecture that will allow systems to keep pace with requirements for many years.

DESIGN INNOVATIONS

Variable Microcycle Timing. The micro-instructions of a control processor do not all need the same amount of time to execute. Ignoring this, most microprogrammed computers simply define the micro-instruction execution time as that of the longest micro-instruction. This wastes time. A sign test operation on a register, for example, may require only 60% of the time it takes to output a control processor register to an I/O device interface.

An innovation from Hewlett-Packard, Variable Microcycle Timing (VMT) prevents this waste of time by adding instruction monitor and control logic. With this logic, the control processor's cycle time is dynamically altered to match the time required by the current micro-instruction.

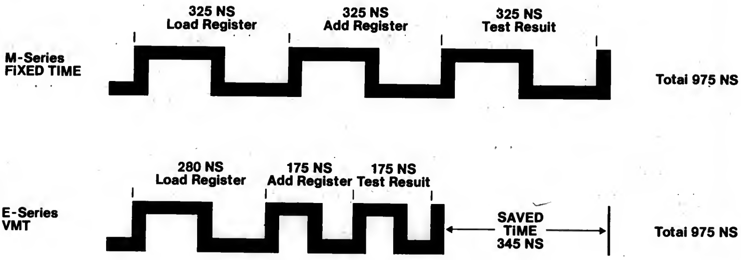
HP simplified VMT by dividing micro-instructions into two classes—those executing at less than 175NS and those executing at between 175NS and 280NS. Through a carefully optimized design, this innovative two-class VMT approach achieved an overall 30% increase in 21MX system performance—all at an insignificant increase in hardware cost.

Asynchronous Memory. Memory technology is changing at a tremendously rapid rate. Consequently, users want assurance that their computers will be able to take advantage of faster, larger, more reliable and less expensive memories as they become available.

In a microprogrammed computer, like the 21MX E-Series, using fully asynchronous interface with memory is an innovation that permits the use of new memory technology. An asynchronous system is flexible enough to interface with a wide variety of memory systems that take advantage of changing memory chip technology. The E-Series performance, then, will dramatically increase simply by changing memory boards.

In an asynchronous system, memory takes only the amount of time required to perform a read or write operation, then immediately informs the processor that it is available again as a system resource. Thus, the E-Series control processor can efficiently execute micro-instructions that do not use memory while memory, in parallel, is busy with a previous request. Asynchronous memory is a truly adaptive design that will allow the 21MX E-Series to continually take advantage of faster memory.

FIXED VS VARIABLE MICROCYCLE TIMING



Thanks to a technique known as VARIABLE MICROCYCLE TIMING and other innovations the 21MX E-Series provides up to 100% performance improvement over the earlier 21XX family members. VMT dynamically defines the micro-instruction execution times. This results in time savings on shorter executing operations.

INNOVATIONS IN USER MICROPROGRAMMING

Over 13,000 HP installations have user microprogrammable computers. All 21XX family members since the 2100 are microprogrammable. This flexible tool has been used by customers to increase the performance, security and flexibility of their systems. And HP has worked closely with users in an effort to acquaint them with this tool. As the result of this contact with our users, we have learned much to help us make the 21MX E-Series microprogrammability more powerful and easier to use.

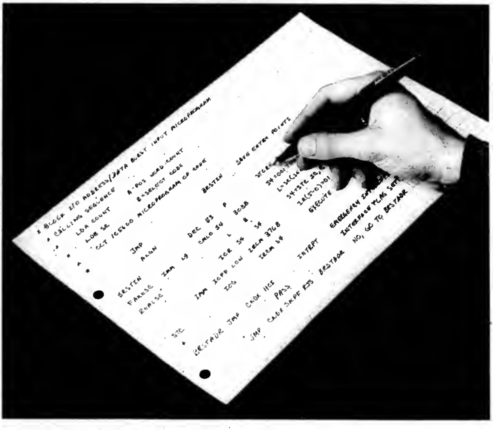
First is a basic increase of control processor address space to 16K words, of which 8.5K words are available for large user microprograms. This innovation speeds execution of subroutines by 3 to 20 times over standard assembly language implementations. Second, as the X-E supports multilevel stacked subroutine calls, it is possible to construct complex programs that use standard E-Series microprograms like floating point, memory management, integer arithmetic, and bit or byte manipulation routines. Third is a set of microprogramming software.

USER MICRO-PROGRAMMING SOFTWARE TOOLS

Making user microprogramming as simple as assembly language programming is the accomplishment of a new microprogramming support package that runs under HP's Real Time Executive (RTE) operating system. It provides a full symbolic assembler, a debug editor, and load utilities in conjunction with a new 1K word Writable Control Store (WCS). Now users can develop, assemble, edit, and test microprograms on line.

One of these utilities enables dynamic swapping of microprograms from main memory or a peripheral disc into Writable Control Store. A driver treats WCS as an allocatable system resource and resolves contentions between users. Control store can be used as a system resource to speed execution of critical, on-line routines. With this dynamic swapping of microcode in and out of control store, the user has unlimited microcode capability.

Microprograms may be stored and used in Writable Control Store or, through another utility program, may be stored on tapes for production of 1K or 4K bit PROMS. PROM-based programs may then be mounted on standard control store cards supplied by HP. Much like library routines, these microprograms may then be called from high level languages like Fortran, Basic, Algol, or Assembly Language and shared among all users of the system to speed program execution.



MICROPROGRAMMING–ON-LINE, OFF-LINE.
Interactive microprogramming makes microcoding simpler, more organized, and helps to retain records. The number of steps in writing a microprogram is reduced, as is the probability of error. Delays associated with batch processing are gone.

With the ease of a finger switch, a user can invoke a confidence check on 90% of the 21MX E-Series circuitry.

SELF TEST CHECKS HARDWARE AND SPEEDS REPAIR

Self test, a microprogrammed feature standard on all E-Series computers, performs a confidence check on 90% of the computer's circuitry either automatically on initial program load, or manually on demand from the front panel. In a matter of milliseconds, self-check diagnostics test the processor's data paths, registers, and memory. Self test can also be looped continuously to exercise computers at any stage of system integration.

Upon termination of a self test operation, the computer's front panel display either indicates a successful completion or notes problem areas, helping the user or HP's service engineers to isolate and repair faulty assemblies quickly.

SYSTEM GROWTH POWER

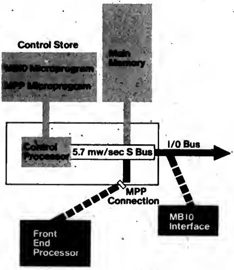
E-Series users have a computer whose power can be increased at will through microprogramming. Two innovative features, the Microprogrammable Block I/O (MBIO) and the Microprogrammable Processor Port (MPP), provide high speed data and control channels which, with microprograms, provide for both I/O and processor growth power. This means increased I/O throughput and processing efficiency.

I/O Growth Power. MBIO provides for greater I/O throughput than standard I/O methods. MBIO is an additional I/O channel capable of transferring blocks of data at rates of up to 3.1 million bytes per second or 50% faster than the normal DMA transfer rate. MBIO is controlled by a user-written microprogram that can be tailored to specific applications. The controlling microprogram can be short and simple for fast data transfers, or more intelligent for applications that require special character recognition, combined address/data transfer, byte packing, and so on.

Processor Growth Power. MPP also provides a means to greater system efficiency through microprogramming. But, unlike MBIO, MPP doesn't use the I/O structure of the E-Series; rather, it gives users a direct window to the 5.7 megaword-per-second main data bus of the E-Series. This direct connection allows extremely high speed data transfers. Front end or parallel processors, such as array processors, high speed A/D converters, arithmetic processors, high speed scanners and Fast Fourier Transform processors may be directly connected to the E-Series via the MPP. MPP is a whole new way of interfacing processors. Interaction between the E-Series and external processors occurs at very high speeds, and can be controlled as precisely as necessary with a user-written microprogram.

The 21MX E-Series is available in two models—the 2109A, at $5850, has up to five memory modules and nine I/O slots; and the 2113A, at $6850, has up to ten memory modules and fourteen I/O slots (U.S. domestic prices only). Discount schedules are available for OEMs. The E-Series has been in HP 1000 systems shipped since last November. Currently, deliveries are within eight weeks.

For more technical information on the 21MX E-Series, simply request a copy of the HP Journal, (circle A) or for further product information, circle B on the attached reply card.



21MX E-Series provide for both I/O and processor growth power with two innovations: the Microprogrammable Block I/O (MBIO) and the Microprogrammable Processor Port (MPP).

ON-LINE/ON-LOCATION DATA COLLECTION

A noted industry expert in manufacturing control, George W. Plossl, in his latest book, states that the last remaining frontier for profit gains is in tightening control of the manufacturing process.

Inventory investments can be reduced and greater production returns can result from wise operational decisions based on a detailed knowledge of the status and flow of production. Computers and information control systems are appropriate tools for achieving such careful and thorough monitoring. But such systems are only as valid as their data; thus the need for accurate and timely data collection.

The best approach to collecting such data is to capture it on-line, on-location, at its source. And one of the best systems for capturing this source data is a combination of the new Hewlett-Packard 3070 Real Time Applications Terminal and an HP 1000 system. The HP 3070 can be operated simply and easily by personnel who have no computer experience.

The HP 3070 recognizes two realities of the source data entry environment. First, more than likely, those people who are data sources have little, if any, computer sophistication or knowledge. Any device they use should be unimposing and easy to operate. Second, as the sources are usually scattered, the data entry terminals must be dispersed economically.

Gone is the hunt and peck method of searching for keys. The 3070 keyboard is simple, unassuming, and clearly marked. Specially prepared label paper can be custom lettered with recognizable calls and placed under protective plastic. Ten special function keys are software-interpreted so the user's single key stroke conveys an informative message. A set of fifteen tutorial prompting lights can be computer-controlled to guide the novice user's input sequence and to communicate warnings or special requests. A numeric display is positioned to be visible over a wide viewing angle.

THE TAILORABLE HP 3070
The new HP 3070 Data Entry Terminal can be tailored for use in various aspects of manufacturing operations such as inventory status; cost accounting; production testing and reporting; order tracking and status; and maintenance reporting. Using convenient, quick-change paper inserts, the Special Function Keys and Prompting Lights may be custom labeled to suit a specific application. Connection to the HP 1000 via Serial Link Cable is a quick and simple plug/unplug. As each HP 3070 terminal is independent, location changes can be made without disrupting the network.

MULTI-DROP SAVINGS

The HP 3070 data collection network is based on a multi-drop concept. Unlike traditional systems where software accounts for all terminal handling, some of these tasks are accomplished by hardware, specifically by the HP computer interface card (controller board). Although this capability may vary with individual applications, the multi-drop concept allows as many as 56 HP 3070 terminals to be physically connected to a single, twisted-pair cable called a Serial Link Cable, which in turn connects to a single HP controller board in the HP 1000 system. The data entry network can extend as far as 4Km (2.4 miles), and terminals can be conveniently connected anywhere along the cable.

Cost savings resulting from a multi-drop approach are clear. One cable is used, not many. And the HP Serial Link Cable is not an expensive one to begin with. Cumbersome, costly cable installations are not necessary. One single board controls the entire network of HP 3070's and eliminates the expensive hardware common in traditional systems where each terminal must have its own controller interface.

MULTI-DROP FLEXIBILITY

In the flux of a manufacturing environment, it is important not to be restricted by an inflexible data collection system. And there must be potential for expandability and response to growth possibilities. Such flexibility is an integral part of an HP 3070 network, for each HP 3070 terminal is completely independent of the others. As the computer addresses and polls each terminal separately, neither the computer system nor the network is disturbed by an addition or location change of terminals. Terminals are connected and disconnected easily. Simply plug and unplug the HP 3070 from the Serial Link; the connection box is much like the phone jack in homes.

HP-IB COMPATIBILITY

Further expansion of a data entry network is possible since the HP 3070 includes the necessary commands and protocol to communicate with HP-IB* compatible devices. Thus, the HP 3070 can be used, not only for manual input of data, but also as a device to input data that is already in machine readable form. Data generated from an HP-IB instrument or instrument cluster can be entered into a system with an HP 3070.

"ERROR FREE" DATA TRANSMISSION

Assuring that data arrives error-free to the computer is especially critical in the electrically-noisy environments typical of most manufacturing operations. Aware of this fact, Hewlett-Packard has designed hardware for the HP 3070 which maximizes noise immunity and detects and corrects errors. It is extremely unusual to apply such thorough techniques to a data entry terminal, and the result is a dramatic reduction in the transmission of data errors.

HP uses a photo coupler device to electronically isolate the terminal and thus provide noise immunity from most disturbances. Further protection against transmission of errors is provided by hardware that automatically detects errors at the data receiving device—the controller board or the HP 3070 Terminal. By attaching five redundancy bits to each character being sent, a check is provided for the receiving device to ascertain whether the transmission was made accurately. If an error is detected, the system provides for an automatic data re-transmission. The extent of protection afforded is reassuring. Each character's transmission can recover 100% from up to six bits in error.

A SMART CONTROLLER BOARD

The controller board of the HP 3070 was designed to minimize the control that the CPU needs to exert for tasks like polling and management of the loop. It also avoids redundant capabilities in the terminals. Giving intelligence to the controller board reduces system overhead necessary to control the network. This efficiency is accomplished in several ways.

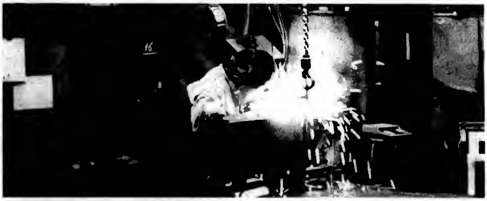
First, polling is restricted to the minimum number of terminals that need to be polled. Next, the effective data transmission speed dynamically varies. It is automatically and optimally determined, not by the total number of terminals on the data collection system, as is traditionally done, but by the number requested by the software at the time. This time savings is substantial, for rarely do all terminals transmit simultaneously.

Finally, the controller board has a "memory;" it polls and buffers each terminal before sending the block of data to the computer for processing. This minimizes CPU interruption and reduces system overhead. With this innovation, data transfers can be made more efficiently.

The HP 3070 Data Entry Terminal is priced at $1470 (U.S. domestic prices only). OEM and end user quality discount schedules are available.

*HP-IB (Hewlett-Packard Interface Bus) is Hewlett-Packard's implementation of the IEEE Standard 488-1975 "Digital Interface for Programmable Instrumentation."

If you are interested in receiving more information about the HP 3070, or the HP 1000 computer, circle C on the attached reply card.



"ERROR FREE" TRANSMISSION
In a manufacturing plant near Grenoble, France, we installed 2Km (1.4 miles) of Serial Link Cable, to connect a 21MX based computer system to the new HP 3070 Data Entry Terminal. To create an electrically disturbed environment, the cable was wrapped around the power lines of numerous massive welding machines.

A continuous flow of data was transmitted to and from the HP 3070 terminal and was monitored by an HP computer. Even under these extreme conditions, no errors were received during this intensive eight-hour field trial. "Error-free" transmission is an HP 3070 innovation.

USER TESTED PERFORMANCE

Standard Oil of California provides next day shipment to customers.
The computerized corner drugstore relieves 90% of behind-counter clerical workload.

Standard Oil Company of California's computing resources now are available to their service stations and direct buying customers as they place phone orders for the company's products as a result of a recently launched distributed processing network.

SOCAL's Southwest area customers now can receive next-day shipment from the company's inventory of approximately 3,000 packaged petroleum and TBA (tire, battery and accessory) products.

In addition to providing the company's order entry personnel with online video display terminals, the multifunctional network controls a host of other operations: inventory adjustment, warehouse control, manpower projections and fill line scheduling.

Making this possible are two remote Hewlett-Packard minicomputers, the first of a national network of up to 18 planned distributed processors, initially running at two of the company's Southern California distribution points: its Los Angeles TBA warehouse and its El Segundo package petroleum warehouse.

The online, real time model HP 21MX minicomputers will be controlled by a HP 21MX central mini, which in turn will transmit confirmed orders and inventory data to a System 370/168.

The network, designed to enhance customer service was developed jointly by SOCAL and its systems contractor, MST (Management Systems Technology) of Chicago.

A Chevron dealer can place one phone order through the Los Angeles TBA warehouse for any of 1,200 TBA items and package petroleum products sold at service stations. The order can be delivered in one shipment within 24 hours.

Order entry personnel may access account files by customer name, service station number or account number. Displays alert them to special promotions and quantity price breaks. Products are accessed by either codes or a specially designed alpha technique that allows the same product to be identified by different input keys.

The computerized corner drugstore...

Computerized pharmacy is no longer a prediction. It is a reality. Management Systems Technology of Chicago installed its first Script Control™ dispensing system last fall at the Midwest's largest drug wholesaler.

Eight separate steps involved in dispensing drugs manually are reduced to a simple one step entry. As a result, approximately 90% of the pharmacists' behind-counter clerical workload is eliminated and up to 80 prescriptions per hour can be filled.

A Hewlett-Packard 21MX based Minicomputer System maintains a central data base accessable 24 hours daily and controls remote video displays and hard copy printers at subscribing pharmacies that will number 400 by the end of this year.

One of the HP 21MX Minicomputers with 64-K bytes of memory, together with varied HP peripherals, located at the central wholesaler site, can accommodate 16 pharmacies. Proprietary MST software was designed by pharmacists with pharmacists in mind. Druggists can interact with a Script Control system simply and with no previous computer knowledge.

For example, instantly after entering prescription number and drug identification, Script Control, in one step, accomplishes the following: prices the prescription; maintains the patient's profile; checks for drug interactions and allergic reactions; prints the label, receipt, alert messages and refill sticker; and prepares all tapes and documents for third party and state billing.

Savings derived from the use of Script Control are real and directly improve the profit picture for the pharmacist. Average third party rejection rate has been reduced to less than 1%. Headaches associated with constant price changes of pharmaceuticals are eliminated. Script Control uses the latest price and in addition lists generically equal drugs that when appropriate can be substituted at a cost savings to the patient.

The 22 functions of Script Control are under the complete control of the pharmacists. Changing from activity to activity is done simply by entering 3 keystrokes.

Byproducts of Script Control automatically filter into pharmacy record keeping and gives the pharmacist a new level of management control that was previously unattainable. Gross profit analysis, item movement and labor scheduling reports are three such examples.

Several years ago, MST also using HP computers, developed a predecessor system, CPS™ (Consulting Pharmacy System). Used by pharmacists who specialize in serving skilled nursing centers, CPS presently is processing more prescriptions than any other available computerized system.

HEWLETT PACKARD

COMPUTER ADVANCES

INNOVATIONS FROM HEWLETT-PACKARD

DIRECT RESPONSE CARD

For fast response, please use this prepaid reply card.

○ Please send me more information.

☐ Please contact me.

○ ☐ A. 21MX E-Series
○ B. HP Journal (21MX E-Series)
○ ☐ C. 3070
○ ☐ D. HP 100 System

NAME

TITLE COMPANY

ADDRESS

CITY STATE OR PROVINCE

ZIP OR POSTAL CODE COUNTRY

TELEPHONE

Computerworld

CW 3-77

FIRST CLASS
PERMIT NO. 141
CUPERTINO
CALIFORNIA

No Postage Necessary if Mailed in the United States

BUSINESS REPLY MAIL

Postage will be paid by

HEWLETT-PACKARD
1820 Embarcadero Road
Palo Alto, California 94303

ATTN COMPUTER ADVANCES REPLY

By Salvaging 'Superfluous Americans'

DPers Can Bridge Job Displacement Gap They Create

By Lewis A. Lardaro
Special to Computerworld

A recent university seminar concerning the displacement of individuals from the ranks of the employed to that of the unemployed seemed to profess that the DP industry is a prime contributor to the dramatic increases in the unemployment rate. The contention was that advances in technological growth diminish the need for the manual or blue-collar worker and result in the escalating of unemployment figures.

Surely some of the onus rests with the DP industry since, through our system endeavors, the displacement gap widens at an ever-accelerating rate. This is manifested quite clearly when one considers that new systems are cost-justified from, among other things, staff reductions.

Further, our systems' efforts demand better educated and well-trained individuals to respond to our poorly developed instructions and esoteric messages.

Andrew Hacker, in *The End Of An American Era* (Atheneum, New York, 1971), supports this thesis by stating that two distinct groups of Americans are emerging. One group can be described as "Corporate Americans" and the other group as "Superfluous Americans."

"Corporate Americans" are those individuals protected by the corporate umbrella; "Superfluous Americans" are the unemployed, ill-trained human beings displaced by contemporary technology.

Affirmative Action programs give us a unique opportunity to rectify some of the injustices. Skills inventory systems must be developed or expanded to include an accurate account of all employees because blue-collar workers could provide a wealth of potential candidates for careers in data processing.

The shift in programming languages, from the ancient machine languages to the current high-level, English-like, query-type language of today, reduces the mathematical, engineering and scientific requirements formally demanded of entry-level programmers. This affords DP departments more leverage in hiring programming personnel and provides an excellent opportunity for bridging the displacement gap.

Hacker believes, and rightfully so, that technological advances have created the hiatus and that technological advances must be used as the counterveiling force in ebbing its progress. Evidences of the foregoing are already prevalent in today's society.

Computer technology and data communications are being used as tutorial aides in the hope of improving the educational level of society. Computer-assisted skills inventory and personnel systems are being used to maintain and track an individual's educational and skills profile. The DP industry must continue to look for new horizons in narrowing the displacement gap so equilibrium and harmony are maintained in Corporate America.

Reader Commentary

While not all displaced individuals are potential candidates for careers in data processing, recruiting practices should include a search of a department or section that is the subject of a data processing project. The key is not to limit our search to those threatened individuals, but to concentrate on the entire department for candidates.

Any individual, whether threatened or not, who is salvaged from a jeopardized department will have a positive effect on the displacement gap. Thus, technology can yield greater reward for all areas and a positive affect in reducing the number of "Superfluous Americans."

Lardaro is manager of computer applications in the Telecommunications Systems Development sector at American Express Co., New York.

Letter to the Editor

Technical Writers Need Own Corporate Organization

In his fine article on technical writing ["Tech Writers Need More Than Knowledge About DP," CW, Feb. 14], Don Johnson indicated technical writers must combine several elements of art and technology in order to produce the best and most useful end product. I couldn't agree more.

But he also touched on a significant problem that plagues all of us who are involved in the creation of technical documents. All too often, the role of the technical writer is minimized by technical managers and their staff. Because programmers, analysts and engineers often have tight schedules, they are reluctant to take time to work with a technical writer.

That's understandable to a point. But it is important to remember that good documentation plays a significant role in user acceptance of the end product. Inadequate or poorly conceived documentation can substantially impair the marketability of any technical product, no matter how good the product may be.

Upper management can and should play an active role in ensuring that product documentation receives the attention it deserves. One of the best ways to accomplish this is to move tech writers and other documentation production personnel out from under the direct control of technical managers.

Technical writers should be organized under a manager whose only concern is the creation of documentation. The resulting publications group should be given corporate stature, if possible, so it can properly execute its responsibilities and ensure uniform applications of corporate publications standards to all company documentation.

Lee E. Hendrickson
Los Angeles, Calif.

How to get your own free ticket to COMPUTER EXPO 77

1. **Circle the job title that most nearly describes your responsibilities:**
President, Executive Vice President, Vice President–Operations, Director of Data Processing, Data Processing Manager, DP Operations Director, Administrative Manager, Senior Systems Analyst, Senior Programmer, Engineering Management, Engineering Staff, Financial Officers, Operating Department Heads.

2. **Circle the city and dates most convenient to you:**
San Francisco Civic Auditorium—March 29–31
Los Angeles Convention Center—April 5–7
Cleveland Convention Center—April 19–21
Minneapolis/St. Paul, St. Paul Civic Center —April 26–28
Chicago, McCormick Place—May 3–5
New York Coliseum—May 10–12
Philadelphia Civic Center—May 24–26
Washington, DC, Sheraton Park Hotel —May 31– June 2
Boston, Northeast Trade Center (Rte 128, exit 39) —June 7–9

3. **Circle those dates on your business calendar.** Then show up and register! As a qualified professional, that's all you need to do to take part in the varied exhibits, demonstrations and exhibitor seminars.

SEE: *Live Demonstrations and Displays* of new computer products and services, including Communications Terminals, Software, Minicomputers, Data Input Equipment, Computer Output Equipment, Supplies, Magnetic Media, Modems, DP Education, Small Business Computer Systems, Flexible Disk Drives, Data Communications Interconnect Equipment, Miniperipherals, Magnetic Tape Transports, Cassette Systems, Power Supplies, Printer Terminals, Keyboards . . . and more! Every day from 10 AM to 5 PM.

VISIT: *Free Exhibitor Seminars* covering the selection and use of these products and services. These free seminars will be held every day.

ENROLL: Case *Study User Forums** will be conducted in all nine cities by leading users and independent consultants. Topics are: Applying Minicomputers (Tuesday) • Managing Terminal Networks (Wednesday) • Improving Software Productivity (Thursday)

NOTE: *Computer Designer Forums** will also be available in San Francisco, Los Angeles, Chicago, New York and Boston. Topics include: Evaluating and Using Microprocessors • Evaluating Peripherals for Mini- and Microcomputers • Evaluating Memory and Storage Devices

*The Forums are held in conjunction with COMPUTER EXPO and require separate registration and fees. They are held each day from 9 AM to 1 PM. One day's admission fee is only $45, additional days are $35. Advance registration is recommended. Call (800) 225-3080 to reserve your space and get complete registration materials.

Come to the Computer Show that's coming to you— COMPUTER EXPO 77—Organized by

COMPUTER CARAVAN 77

A division of Computerworld, Inc
797 Washington Street, Newton, MA 02160

Programming Language Often Only a Status Symbol

By Miles Benson
Special to Computerworld

Have you ever thought of a programming language as a status symbol?

I mean, suppose your shop had its own language, used nowhere else, tailored to your application and solutions. Whatever else it might be to you, it would probably be a status symbol as well.

The Sociology of Computing

Picture the conversations at computing conferences:

"Why no, we don't use Cobol for business applications. Ourownia is the language we use. It was designed and implemented in-house, and our programmers love it."

"Fortran? I'd almost forgotten it existed. No, we use Ourownia. It has a special set of built-in engineering functions tailored to our company's business."

"We gave up Assembly language years ago. When we designed Ourownia, we included system-specific features to optimize use of our hardware."

Far-fetched? Nonstandard? Counterproductive? Probably.

But it has happened. Right here, in the good old U.S. of A. And this is the story of one such language. For the sake of disguise, let's just go on calling it Ourownia.

When I first ran into Ourownia, I was working on a proposal for a government contract, and one of the tasks was the selection of a programming language to use to code the applications. Since we at Softpro Software Intended to use our own Marketronics 3-PI computer to implement the system, we naturally figured that PL/PI was the language to use.

But the government agency to whom we were sending the proposal asked us to evaluate Ourownia as well. Seemed a little odd at the time, but then programming languages have proliferated like oversexed rabbits over the years, and I wouldn't have been too surprised if they'd asked us to evaluate Eiffeltoweral.

Matrix Technique

I like to use a matrix technique for evaluating languages. Nothing fancy — just a way of laying out the results so they're easy to compare. Across the top I list the languages. Down the side I list the features each has. In the matrix I say a few concise words about whether each language has the feature and how well. The look of objectivity, with a heavy overlay of subjectivity. But it does the job.

For this evaluation, I stuck to just PL/PI and Ourownia. We already knew PL/PI would do the job, and we were really just scoring Ourownia because we'd been asked to. But I *was* curious — language nuts like me do like to stay on top of the new ones when they come along.

And besides, it really did seem a little suspicious that the government agency had invented a new language. I always did enjoy unravelling mystery stories.

When the Ourownia documentation came, I got my first shock. It was a clumsy looking language, with long and not very informative keywords, odd punctuation and some fairly onerous user standards.

Otherwise, it had a vaguely familiar ring to it. But then all programming languages tend to look alike with a bag over their syntax.

I whipped out my matrix form and began reading for score. The language began to look better as I got down to details. It had all the traditional basic constructs — assignments, loops, comparisons, procedures and several forms of the ever-popular GOTO. Its IFs had THENs and ELSEs. Its loops had WHILEs and UNTILs. Its GOTOs even had CASEs.

Looking Better and Better

I was beginning to like it better and better. And when I discovered it had BEGIN-END blocks and a reasonable treatment of nested scopes, I almost got excited.

But that wasn't all. The data declarations were a joy. Besides all the predictables, like floating and integer and even scaled fixed-point and decimal, there was a data structure treatment that allowed for both arrays and nonhomogeneous data aggregates. Bit strings and byte strings, independent of word boundaries, were there in all their glory.

It was a good, complete, modern language, with a lot of good, solid pragmatics and a dash of theory. Maybe the government agency wasn't as parochial as I thought.

At this point in time, the PL/PI column in the matrix was still empty. I knew the language pretty well, but I still needed to make a pass through the documentation to make sure I was accurate.

PL/PI is a good, rich, modern language, too cumbersome for its own good but at least powerful enough to do the job. I've seen better languages, or at least languages that looked better at first glance, but inevitably some small but vital feature has been omitted for ease of implementation or out of laziness or ignorance, and its absence rears up and bites you when you need it most.

Rapid Scoring

The scoring of PL/PI went rapidly. A couple of hours after I started, the matrix column was half complete. It was then that I began to notice it. There was an amazing similarity between the two columns in the matrix. PL/PI's entries read like a duplicate of Ourownia's. I began wondering about it.

I wondered more as the scoring progressed. I wondered most of all when I finished. Ourownia, the scores showed, was a functional carbon copy of PL/PI. Oh, the carbon was smudged a little. The government agency had added a few bells and whistles, like debugging capability. But basically, the languages were identical. Except for syntax.

I mulled that one over for a while. And the message began coming through. Someone had deliberately defined a carbon copy language, tacked on a few extras and then distorted the syntax to hide the crime.

If you only had a casual knowledge of computing, you'd never know what happened. The languages didn't look at all alike. Installation managers, or high-ranking officers or Senate investigating committees would never see the sameness. Only the grunts who used Ourownia might catch on. And why would they care?

Which brings us back to why, in fact, anyone would care to perpetrate this perverse level of white-collar computer crime in the first place. The only possible answer lies in the first sentence of this story:

Have you ever thought of a programming language as a status symbol?

Well, whoever authorized and/or authored Ourownia sure did. It was its only reason for existence.

LOOK,™ YOU'RE THE BEST RESOLVE II™ SALESMAN WE'VE GOT.

Find out why people who look at Look to monitor day-in, day-out operational problems buy Resolve II to solve them. On-line, in real time.

Call or write us today.
In California: 408/735-9550. Outside California, dial toll free: 800/538-1872.

THE PERFORMANCE PEOPLE
Boole & Babbage
Operations Division
850 Stewart Drive
Sunnyvale, CA 94086

In Modular Packages

Altair 8800 Micro Users Get Business Applications

ATLANTA — The interests of the business-oriented DP user are beginning to be recognized by the microcomputer vendors; the Altair Software Distribution Co. (ASDC) has announced the Altair Business System software for use on the Altair 8800.

The software includes packages for accounting, word processing and inventory control. The accounting system includes four modular packages which can be used by themselves or as parts of an integrated whole, ASDC said.

Of the subsystems, the general ledger routines are available now, while the payroll, receivables and payables packages are still in development, but are expected to be available for delivery by the end of the second quarter.

The ledger system generates monthly balance sheets and income statements. The payroll system will handle both salaried and hourly personnel for both periodic payments and reports for government agencies. The receivables package will handle invoicing and monthly statements of customers, while the payables routines keep track of current and aged vendor accounts.

The word processing package is described as a flexible text editor system that allows large-volume text material — such as contracts or other lengthy documents — to be stored, updated and prepared for printing.

The system is capable of supporting both simple in-line corrections and global editing functions, a spokesman added.

A single document under the word processing system may contain 120,000 characters or about 35 single-spaced pages, and documents may be linked for longer text.

The inventory management package was designed to allow a user to construct the fields of an inventory file and to maintain them on-line. In its off-the-shelf form, available now, the package is structured for a typical retail store whose inventory policy is based on minimum reorder points.

The Altair 8800 hardware, on which these systems run, may be individually configured for each installation. However, in addition to the CPU, it typically includes 48K bytes of memory (20K of which is used by the operating system), a CRT terminal, a "typewriter-quality precision printer" and one or more floppy diskettes, the company noted.

Written in Altair's disk Basic, the software packages range in cost from $5,000 for the full accounting system to $2,000 each for the word processing and inventory runs.

They are distributed through 26 Altair computer centers throughout the U.S., but inquiries can be addressed to ASDC at Suite 343, 3330 Peachtree Road N.E., Atlanta, Ga. 30326.

'APO' Restructures OS/VS1 Programs

SUNNYVALE, Calif. — The Automatic Program Optimizer (APO) now enables IBM OS/VS1 users to increase throughput and reduce overhead through measurement and restructuring of programs without operator intervention, according to the vendor, Boole & Babbage, Inc.

APO was introduced some time ago and is still available for OS/VS2 sites, a spokesman noted. However, VS1 users were often the ones who really needed the capabilites of the package more than did the VS2 installations, the spokesman added.

VS1 systems are generally being used to near capacity; as a result, any backup of work caused by poor throughput or a bad run throws off their scheduling efforts, he said.

APO was designed to reduce paging overhead; increase throughput and shorten batch turnaround time, the company noted.

Working independently of the operations staff, APO avoids language dependence, special measurement runs and recompilations. It measures programs in a production environment, the spokesman said.

The software helps users determine which programs will benefit most from optimization, develops inter-CSECT reference data, determines the optimal ordering of the module's CSECTs and creates a new, restructured load module ready for execution.

The use of APO is not limited to use with any specific program and has been used to optimize both proprietary and user-developed programs. Users have reported improvements of up to 91% in their paging rates, the spokesman claimed.

Another user recorded an improvement of 20% in working sets resulting in a 25% improvement in throughput, he added.

APO costs $12,000, but a 20% discount is available through April 30, the spokesman said from company headquarters at 850 Stewart Dr., Sunnyvale, Calif. 94086.

'TUG' Eases Test Data Generation

MINNEAPOLIS — The Technalysis Utility Generator (TUG) was described by its developer — Technalysis Corp. — as "a functional and fresh approach to test data generation" for IBM 360/370 environments.

Ease of use was said to be the primary concern in the product's design.

Although substantial volumes of data can be generated, the developers argued that a limited amount of exactly controlled data is a better, more-effective test of a program than are massive amounts of live data or samples from it.

Tugims, an extension of the original package, provides for initial loading of physical and logical data bases and support for insert, replace, delete and dump functions in existing data bases under IBM's Information Management System.

Data Base Support

Logical data base relationships are "easily handled" through use of Tugims, the vendor claimed.

The package allows up to 40 records (400 segments in Tugims) to be allocated and defined. Data manipulation commands allow field modification as records or segments are output, the spokesman added.

Record definitions are language independent and are usually stored on disk files, which allows systems analysts and users to participate fully in the testing cycle, he said.

Licenses for TUG are available for $4,000; the Tugims option costs another $2,000, the spokesman said from 4640 W. 77th St., Minneapolis, Minn. 55435.

'CICS Dump Analyzer' Enhanced

NEW YORK — The Interactive Transaction Dump Facility (ITDF) was designed by Commercial Software, Inc. as an enhancement to the company's CICS Dump Analyzer in support of users of IBM's Customer Information Control System (CICS), according to a spokesman.

ITDF can be activated from any IBM 3270 terminal in the user's CICS network and the activation can be limited to specific transaction and terminal combinations, he said.

Once activated, the software will intercept calls to the Dump Control Program, record the requesting transaction and call the Dump Control Program to provide the normal hard-copy dump, but store it on disk.

Dump Storage

ITDF allows the user to select the maximum number of dumps to be retained in temporary storage, to selectively purge dumps — presumably after they have been analyzed — or to request that particular dumps not be purged.

ITDF maintains a directory of currently stored dumps and their status, which may be displayed at a 3270 terminal. Each entry is given a unique number and access to any stored dump is by that number.

Commands permit paging through the dump or through a control structure.

The CICS Dump Analyzer, including ITDF, costs $165/mo for OS sites or $175/mo for OS/VS and DOS/VS installations.

The firm is at 420 Lexington Ave., New York, N.Y. 10017.

Guide Compares Software

PHILADELPHIA — The *Vendor Matrix* was developed by Hay Associates to help installations in sifting through the maze of personnel and payroll software on the market and in sorting out sales claims from technical specifications, according to a spokesman.

The guide is not set up to suggest ratings for various aspects of the different products covered, he stressed. It simply gives a side-by-side comparison of the offerings of 15 personnel/payroll system vendors, with as many as 150 pieces of information on each, he said.

The *Vendor Matrix* is available as a stand-alone product for $300 or as part of a day of consulting provided by Hay for $500, the firm said from 1845 Walnut St., Philadelphia, Pa. 19103.

Package for PDP-11 Releases Disk Space

BEDFORD, Mass. — Delobj — a program for Digital Equipment Corp. PDP-11s running under RT-11 — frees disk space by deleting object files which have corresponding source programs on file, according to a spokesman for the Bedford Group, the package vendor.

The software scans a specified device on which program libraries reside. If it finds a Fortran or Macro source program as well as an object-level version of the same program, it drops the object code and releases the disk space for other uses.

The firm can be reached through P.O. Box 352, Bedford, Mass. 01732.

JASPER
JOB
ACCOUNTING
SYSTEM

- JOB ACCOUNTING
- VS PAGING ACTIVITY
- FORMS USAGE REPORT
- POWER/VS ACCOUNTING
- A COMPUTER CHARGEBACK SYSTEM
- COMPUTER PERFORMANCE ANALYSIS

JASPER is a Job Accounting and billing system for DOS or DOS/VS computers.

The VS version captures paging statistics and utilizes the POWER/VS Spooler accounting records to measure reader, printer and punch activity and provide turnaround and que time statistics

User billing is handled by a sophisticated report generator program that lets you "do it your way".

An optional performance analyzer program gives JASPER a "hardware monitor" capability that no other job accounting system can match. CPU, Paging and Device Activity are plotted by a graph generator in a series of "Activity vs Time" graphs that measure overall computer performance and spotlight over, and under utilized equipment.

Yes! Rush full information about Jasper & the 30 day Free Trial
For faster action call collect Datachron Corp. (212) 675-5333

DATACHRON • 174 FIFTH AVE. • NEW YORK N.Y. 10010 • 212 • 675•5333
name ____________________ title ____________
company ____________________ tel. ____________
address ____________ city ____________ state ________ zip ________
cpu model ____________

Codasyl Asking Project Help

MONROEVILLE, Pa. — The Executive Committee of the Conference on Data Systems Languages (Codasyl) has approved the organization of two new standing committees and is seeking people and institutions to work on them.

The End User Facilities (EUF) Committee will develop specifications for "facilities which will allow noncomputer personnel to interact with the computer and its resident data base in a manner natural to such users," according to committee chairman Henry C. Lefkovits, an independent consultant from Harvard, Mass.

The Common Operating System Control Language (COSCL) Committee is being organized to determine what possibilities exist for a job control language that is common to a number of different computers. This committee still needs a chairman, Codasyl's Executive Committee secretary, Thomas Rice of Honeywell, noted.

In announcing the projects, Rice urged people or organizations — users or implementors — interested in working on either or both committees to contact him at 50 Presidents Lane, Quincy, Mass. 02169.

National Semiconductor

Just one of the many leading companies you'll see at

COMPUTER EXPO 77

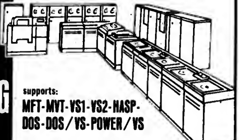
National Semiconductor will show a full spactrum of OEM memory systems, microprocessors, and microcomputers. Computers on a chip. Computars on a card. And modular semiconductor memorias that plug into standard minicomputers or custom systams. It's a full spectrum. Coma see.

Organized by:

COMPUTER CARAVAN 77

The national computer exposition that's coming to you.
797 Washington Street, Newton, MA 02160
(617) 965-5800.

San Franciaco • Los Angalas • Clavaland • Minneapolis/St. Paul
Chicago • New York • Philadelpia • Washington, D.C. • Boston. Starts March 29th.



OVER 900 DP Managers now use the JOHNSON JOB ACCOUNTING REPORT SYSTEM

Send for FREE 30 Page System Characteristics Manual

■ Accurate Job Accounting ■ Continuous Performance Measurement ■ Equitable Cost Distribution ■ Optimized Software Performance ■ Accurate Customer Billing ■ Realistic Thruput Analysis ■ Optimum Resource Utilization

supports:
MFT-MVT-VS1-VS2-HASP-DOS-DOS/VS-POWER/VS

JOHNSON SYSTEMS INC. CW 321
8400 Westpark Drive, McLean, Virginia 22101

NAME ____

TITLE ____

COMPANY ____

ADDRESS ____

CITY ____ STATE ____

ZIP ____ PHONE ____

COMPUTER ____ OPERATING SYSTEM ____

'Tracer' Eases Fortran Debugs For Users of DG, DEC Minis

PALO ALTO, Calif. — Debugging of Fortran programs on Data General Corp. and Digital Equipment Corp. minis is simplified, and therefore done more quickly, with the Tracer package, according to the vendor, Information Processing Techniques Corp. (IPTC).

The debugging tool replaces core dumps and "randomly placed diagnostic . . . statements" for programmers working with DG's Nova and Eclipse or DEC PDP-11 configurations. Instead it prepares formatted reports of user-selected factors bearing on program execution.

The reports can show, for example, values assigned to variables, printed according to their data types. They can also document IF statement values or the flow of control through listing of statement labels when executed or subroutine names and arguments upon entry, a spokesman explained.

The choice of where the reports go as well as what they contain is up to the user, he added. The default option can be the console typewriter, a line printer or a CRT, but another alternative is a magnetic tape, which would be useful for later detailed analysis, he suggested.

Although Tracer adds some overhead to the program being debugged, this cost varies with the amount of support the debugging aid has been invoked to perform. The overhead would normally be eliminated through recompilation once the program is "clean" and ready for production, the company noted.

Tracer is currently available for use under DG's RDOS or under either RSX or RSTS/E on the DEC equipment. The package can be acquired for a one-time lease fee of $1,200 from IPTC at 2462 Embarcadero Way, Palo Alto, Calif. 94303.

GRI 99 Accounting Units Allow Single Run for Multiple Firms

N. BRUNSWICK, N.J. — A general accounting package incorporating inventory control, accounts receivable and general ledger systems for multiple companies is now available for GRI Computer Corp.'s System 99 small business computer, the vendor said.

Each of the three subsystems can be obtained and operated separately.

In addition to performing all conventional functions, the inventory system provides sales reports based on current activity and sales history data. Calculation of average costs, accumulation of product class totals and physical inventory capabilities are supported by this portion of the package, GRI said.

The general ledger routine is built on standard accounting principles and methods. It supports the creation of a chart of accounts, posting transactions to the accounts and producing records from them.

While all three portions of the GRI package allow multiple companies to be processed in a single run, the ledger routines also allow departmental income statements to be generated. These statements can include budget information as well as current month and year-to-date balances, GRI said.

RPG-II Version

The accounts receivable system follows the balance-forward method of processing.

The programs in the general accounting package are written in GRI's real-time version of RPG-II. Costs of the individual systems are $1,250 for inventory, $1,495 for general ledger and $1,650 for accounts receivable.

GRI's Filesort software, costing $1,670, is needed for the proper operation of any of these accounting systems, the spokesman noted from 870 Georges Road, N. Brunswick, N.J. 08902.

Pension Processing Runs on 16K IBM 3

FRAMINGHAM, Mass. — Firms can use a 16K IBM 3/10 to handle the recordkeeping and reporting provisions of the federal Employee Retirement Income Security Act if they acquire the Erisa/3 software from Alpha Systems, Inc., a spokesman claimed.

The software is configured around an Index Sequential (Isam) file and includes facilities for a data dictionary, for file maintenance and for a report dictionary as well as a report writer, he said.

Since a number of reports are required by the law, the system produces them without making the user resort to the report writer, the spokesman said. On the other hand, some reports will be available as separate cost extensions since they won't be needed by all users, he noted.

The data dictionary defines the characteristics of fields in the data base, but users may redefine, extend, alter or delete any of these definitions.

The file maintenance routines include a skeleton program to apply payroll updates to the pension file; this part of the system can be completed by the user or by Alpha, the spokesman added.

The report dictionary catalogs frequently used report routines so they can be invoked by name. The Erisa/3 report dictionary includes the means of updating what is stored under its control, he said.

The package is distributed largely in RPG-II source code, although several modules are available only in object form. The software costs $3,500, Alpha said from 1329 Old Worcester Road, Framingham, Mass. 01701.

Data General Adds Basic for Micronova

SOUTHBORO, Mass. — Data General Corp. has introduced a Basic language processor for use under a diskette-based disk operating system on its Micronova family of microprocessor-based computers. It is compatible with Basic already available on other DG products up to and including the Eclipse C/300, the vendor said.

Two Versions

Implemented in both single- and multiuser versions, this Basic is said to include extensions to the original Dartmouth Basic, particularly in the area of string arithmetic and matrix I/O operations.

The Micronova Basic was described as a subset of the language facilities that make up Extended Basic under DG's Real-Time Disk Operating System (RDOS).

Micronova development software includes, in addition to Basic and the disk operating system, an assembler, a Fortran IV compiler, a debugger, loaders and editors.

A code-compatible development system, designed to run on the DG Nova 3, can provide OEMs and end users the facilities of the larger system while building software for the micro family, a spokesman added.

Basic for the Micronova is available for a one-time fee of $1,000, the firm said from its headquarters on Route 9 here in Southboro, Mass. 01772.

DATA 100
CORPORATION
multifunction data processing

Announcing the beginning of the 80's.

Meet the first of a new family of multifunction equipment from Data 100.

Model 82, a remote display system with on-line file inquiry capability compatible with host systems using the IBM 3270 information display system communications protocol.

This Model 82 capability can also be added to existing Data 100 KEYBATCH® systems and Model 78 remote processing systems.

Besides industry standard on-line inquiry features, Model 82 offers unique shared display and backup capabilities.

Its shared display capability saves money by permitting individual display/keyboard units to serve both as local data entry and on-line inquiry stations operating from separate Data 100 systems.

Its backup features allow the 3270 emulation program to run in any appropriately configured dual controller arrangement of Data 100 Model 74, 78 or 82 equipment. Ideal for critical on-line applications.

And Model 82 is easy to install. It connects directly to existing IBM coaxial cabling.

Now, may we tell you more? Write or phone Data 100 Corporation:

6110 Blue Circle Drive
Minnetonka, Minnesota 55343
612/941-6500

3 Place du Commerce
Nuns' Island
Montreal, Quebec H3E 1H7
514/761-4595

Hamilton House
111 Marlowes
Hemel Hempstead, Herts. HP1 1BB
England
(0442) 69161

Our new Model 82 remote display system.

Other Systems in Good Shape

Monitor Gets Airline's TSO Control off the Ground

By Don Leavitt
Of the CW Staff

ARLINGTON, Va. — Allegheny Airlines, Inc. runs three on-line networks on one 4M-byte and one 2M-byte IBM 370/158 and it has established effective performance and analysis systems for continuing evaluation of its reservation and IMS functions, according to Henry Meyer, the director of system performance.

But until recently, there has been little to help in the evaluation and control of the airline's Time Sharing Option (TSO) operations, he added.

Now, however, the company has acquired a software package — TSO/MON from Morino Associates, Inc., based here — and the situation is improving.

It had to. Before getting the package, Allegheny used what little data was provided by the standard IBM-provided SMF selectable analyzer, Meyer said.

The standard TSO Trace facility and its data reduction software were used for diagnostic work but were "simply too resource-consuming to be used otherwise."

In addition, these tools did not provide the level of information management was accustomed to getting in connection with the reservation and IMS systems, he said.

Moving to MVS

All three networks are important to Allegheny — and are growing, he added. The primary operating systems are OS/SVS and the Airline Control Program (ACP), with migration to MVS planned for later this year.

The SVS system has an average concurrent load of 32 to 34 TSO and 70 to 80 IMS users during peak hours, and it's used for program development as well as production systems dealing with market planning, financial planning and economic forecasting, Meyer explained.

The Morino product is in place and doing its job. TSO/MON has been valuable in enabling the airline's management information services to increase the system's capacity while, at the same time, maintaining and even improving response time, according to John Shupe, the director of time-sharing services.

Initially, the detail reports found the system was running out of TSO buffer space and response was degrading during peak loads. This situation was easily corrected by increasing the number of TSO buffers, Shupe noted.

After that, a systematic approach for evaluating TSO performance was initiated by selecting two base-point indicators against which progress would be gauged, he said.

These indicators were the capacity of the system (command rate/hour initially determined to be 700 commands/hour during peak load) and TSO overhead (number of swaps/command which was averaging 2.5 swaps/command).

Additionally, the key factors of response time and CPU usage were also carefully measured for any variation. It was postulated that the swap rate of 2.5 per command was too high for the load of 700 commands/hour and was a bottleneck to increased capacity, Shupe said.

After analyzing several options, the number of TSO regions was increased from five to eight.

Response time and foreground CPU usage were both slightly reduced; the swap rate dropped from 2.5 to 1.4 swaps per command; and the capacity level of 700 commands/hour was increased to over 1,100 commands/hour, Shupe reported.

Improvement efforts have not been limited to just the system. TSO/MON's summarized reporting of interactive user work enabled Allegheny to focus quickly on inefficient use of TSO and take corrective action, Shupe noted.

The most dramatic example was a reduction in one user's foreground load from an average daily usage of 12 min of CPU time and 19,976 EXCPs to approximately 1 min of CPU time and 3,596 EXCPs.

This 92% savings in CPU time and 82% savings in EXCPs were made possible by simple modifications to the file handling and internal table processing of an interactive program, Shupe said.

Capacity Planning

TSO/MON was also used to provide detailed information on the load and usage trend of TSO over a three-month period of time. This information enabled Allegheny to operate both IMS and TSO on the same 370/158, resulting in considerable dollar savings, according to Meyer.

The reports are also being utilized as an aid by the airline's MIS Long-Range Planning Committee to forecast hardware and software requirements, Meyer added.

Users have applied their monthly reporting on number of logons, total connect hours, average terminal think times and TSO response times to their terminal procurement process, enabling them to better decide which terminals are needed and when they should be acquired, he continued.

Cost of Operation

The TSO/MON system has proven to be extremely efficient, especially when compared to other SMF or trace-based analysis systems, Meyer noted. The data collection interface has consistently utilized less than 2% of the CPU, and complete monthly reports are produced in 3 to 4 minutes of CPU time, he said.

Based on its early tuning successes, Allegheny feels confident a further increase in the number of regions will provide more than a marginal capacity increase without any reduction in user service.

The TSO/MON reports have also pinpointed heavily used commands that are candidates for rewrite. When completed, these commands will further improve system responsiveness.

For example, the in-house SUBMIT command when rewritten, will realize a 4:1 drop in command processor overhead for the average 200 times a day that it is invoked, Shupe estimated.

In addition, TSO/MON will also provide management with vital "before and after" performance information to evaluate its SVS to MVS migration in the coming year, Meyer noted.

You can (and probably have) paid more for a terminal with all these design and performance features. But there's no need to pay a premium any longer. The CP10 has broken the price barrier.

And price isn't all. It offers switch selectable transmission rates from 75 to 19,200 bps, and it features full cursor control, RS232C or current loop interface, addressable cursor, erase mode and a hard copy capability with printer interface. The 12-inch digital-type monitor is formatted to display 24 lines with 80 characters per line (upper and lower case optional). And much more.

We know that price and product performance aren't the only criteria for making a buying decision. You'd also like to be sure your supplier will stand behind every purchase

That's why we give you our full attention from pre-sale application advice to dependable service and maintenance back-up . nationwide We've built our reputation on it.

Why do we call it "The Price Machine"? Give us a toll-free call, or use the coupon below, and we'll give you a run-down on how far down our prices are.

the price machine

CP10 standard features

Cursor Control Keys
Erase Mode
Addressable Cursor
Switch Selectable Transmission Rates: 75 to 19,200 bps
Communication Mode: HDX/FDX
24 Lines (80 x 24), 1920 characters
RS232C and Current Loop Interface
Non-Glare Screen
Format Mode
Dual Intensity
Numeric Key Pad
Buzzer

CP10 options

Printer Interface
Controlled Auxiliary Interface
Upper/Lower Case
Block Mode

For a fast response from anywhere...call us **TOLL FREE 1-800-243-9280**

Computer Peripheral Corp.
1225 Connecticut Avenue, Bridgeport, Ct 06607
Gentlemen:
☐ Please send complete data on the CP line of terminal products
☐ Please have a representative call
Name__________ Title__________
Company__________ Phone__________
Address__________
City__________ State__________ Zip__________

Dealer and distributor inquiries invited.

Computer Peripheral CORP.

1225 CONNECTICUT AVE. • BRIDGEPORT, CT 06607 / (203) 333-6330

Presenting the Wizard of OS.

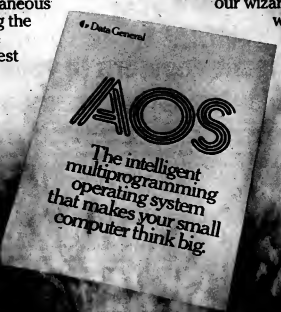
Poof! It's AOS from Data General. An advanced multiprogramming operating system for ECLIPSE computers. That's as easy to use as a snap of the fingers. With intelligence that would make Merlin blush. So look closely.

AOS can make time do tricks. By giving you the power to handle timesharing, batch and real-time users on the same computer, at the same time.

It's no illusion that AOS gives individual users resources that appear to be dedicated exclusively to them. While simplifying control of multiple, simultaneous operations. And letting the people paying for the computer get the best possible distribution of system capability. Our wizard makes it all look so easy.

How does AOS do it? Well, without giving away the whole bag of tricks, AOS gets a good portion of its skill from heuristic CPU scheduling. Along with a lot of special effects to defy the imagination. Like a unique system accounting and security facility. Smart spooler. A multiple batch job stream facility. And high-level languages and utilities.

We shouldn't reveal any more secrets. But if you'd like to find out what other tricks our wizard has up its sleeve, write us. And "poof," our brochure will appear in your mailbox.



Data General
AOS
The intelligent multiprogramming operating system that makes your small computer think big.

Data General

ECLIPSE is a registered trademark of Data General Corporation

Data General, Route 9, Southboro, Mass. 01772, (617) 485-9100. Data General (Canada) Ltd., Ontario.
Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361

SOFTWARE WANTED

for distribution in Germany or Europe – if required: Including maintenance specialist in system-software IBM 360/370 dos, dos/vs and os, os/vs - having very good client-base.-Also software wanted on base INTEL 8080.

RAMELOW UND PARTNER-HAMBURGER SOFTWARE

Postfach 55 08 25,
D-2000 Hamburg 55
Phone Germany 4101-65000, telex 09 21 434 mbhaa d

Compiler Optimizes Fortran on Cray-1, Uses Vector Processing When Possible

MINNEAPOLIS — Fifteen Fortran programs representing portions of actual workloads were compiled at rates exceeding 50,000 line/min and then executed in a recent demonstration of a Fortran compiler for the Cray-1 computer system, according to a Cray Research, Inc. spokesman.

Included in the job mix was a large production run consisting of 2,300 statements, which ran multiprogrammed with a series of smaller jobs under the latest version of the Cray operating system, he noted.

The optimizing compiler, said to adhere closely to the ANS Fortran standard of 1966, makes use of the Cray-1 vector-processing architecture. It identifies and 'vectorizes' portions of programs amenable to such treatment, he added.

As a rule, a vector loop created by the compiler runs three to five times as fast as its scalar loop equivalent, he claimed.

Vector processing, a key to the Cray-1's fast computation rates, allows each arithmetic instruction to generate many results from a single sets of operands, the company said.

Because not all programs are amenable to vectorization, however, the Cray-1 provides a balanced approach by including both vector- and scalar-processing capabilities, the spokesman continued.

The Cray-1 Fortran compiler is being released at no cost to users of the company's systems. It comes in three models, with 256K, 512K and 1M 64-bit words of memory, and ranges in cost from $5 million to $8 million.

Cray Research is at Suite 213, 7850 Metro Parkway, Minneapolis, Minn. 55420.

Package Models Pipeline Parts

DES PLAINES, Ill. — Pipeline, a pipe stress analysis program developed by UOP, Inc., uses finite-element techniques allowing internal modeling of complex piping components, a company spokesman stated.

Written in Fortran IV for interactive use on IBM 360/370 equipment, the program is said to have great flexibility in input and application. Either English or metric input provides for both English and metric output, the spokesman claimed.

Piping dimensions can be entered directly from piping isometrics in feet or in feet and inches, without regard to sequencing of piping layout, he added.

The Pipeline facilities are available on a service basis through UOP Computer Services here in Des Plaines or as a package which can be installed on a user's in-house computer.

The package requires 320K bytes of main memory and, in its normal configuration, costs $20,000.

That figure is, in some respects, a mid-range point, however, since there are "stripped-down versions" available on one end of the range and "bells and whistles" available for the most advanced user, the company said from 10 UOP Plaza, Algonquin and Mt. Prospect Roads, Des Plaines, Ill. 60016.

'Shadow II' Monitor Aids 360/370 Users

WELLESLEY, Mass. — Shadow II, the teleprocessing monitor brought into the U.S. and still marketed by Cullinane Corp. for use with its IDMS data base system, is now available to the more general IBM 360/370 community from Altergo Software, Inc.

An American affiliate of the original English developers, the vendor said the software runs under DOS and OS and their VS equivalents.

Costs start at $20,000 for a small DOS user, Altergo said from 20 William St., Wellesley, Mass. 02181.

MDS.
Many intelligent answers to your distributed information needs.

Every business is different. And within every business, there are differences — especially when it comes to information flow.

MDS knows that. As the industry's largest non-mainframe system supplier, MDS offers the broadest capabilities to fit the needs of a wide range of information systems users. Not with a single product, but with a series of compatible systems that can be configured precisely to today's requirements. And expanded for tomorrow's.

Data Entry.

MDS offers single-station as well as small, medium and large clustered data entry systems. With ready-to-use software or full programmability. And capabilities ranging from simple validation to powerful editing and pre-processing. At the very best price performance ratio available today.

Transaction Processing.

MDS supports your single unit or entire network needs. With products that range from simple document processing terminals to fully programmable transaction processing systems using high-level languages. All are fully compatible with your planned or existing point-to-point or multi-point communications network.

Remote Job Entry.

Regardless of the method you use, MDS can supply it. 2780, 3780, 2968, 360/20 HASP and more. Local storage of JCL's selectable with a single key depression, device substitution and transparency. A wide range of peripheral devices for the throughput you need. And terminals can be linked to your central site at transmission speeds of up to 56K bps.

Local Batch Processing.

Complete job turnaround using small to large data base structures, high-level languages, and your choice of peripherals to enhance your distributed processing capabilities. MDS products do it all.

Look into Distributed Information Systems from MDS.

Within our product line you'll find the economical System 1200, the powerful System 2400 and the versatile System 2300. And our newest entry, the exciting Series 21 family of distributed processing systems. One, or a combination of these systems, could be The Intelligent Choice for you.

Call us at (201) 540-9080
or write our
Executive Headquarters
1599 Littleton Rd.,
Parsippany, NJ 07054.

Mohawk MDS Data Sciences
The Intelligent Choice.

COMPUTERWORLD

. . .the one weekly newspaper that's designed to fulfill your unique "need to know". . . the one newspaper that can give you all the current information you need to benefit you, your organization and your career progress. . . . 52 weeks of incisive news, commentary and special reports. . .subscribe today, use the attached postage paid order form.

☐ *Please enter my subscription*
(details on back)

☐ *I'm already a subscriber, but I'd like you to change my:*
- ☐ *address*
- *title*
- *industry*
- *other*

My current mailing label is attached and I've filled in new information on the other side

Put old label or label information here

RATES. U.S. · $15 Canada and PUAS · $23 Other foreign $40

If charge we must have cardholder's signature.

Signature ____________________

Expiration Date: ____________________

First Initial **Middle Initial** **Surname**

Your Title

Company Name

Mail To:

City **State** **Zip Code**

Address shown is:
☐ Business
☐ Home

☐ Check here if you do not wish to receive promotional mail from *Computerworld.*

10 Manufacturer of Computer or DP Hardware Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government - Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other ____________________

11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other ____________________

Detach here, fold, and place in post-paid envelope attached through binding.

Decwriter III

Decwriter III Has Micro Controller

MARLBORO, Mass. — Digital Equipment Corp. has developed the LSI120 Decwriter III, a 1,200 bit/sec keyboard printer with a microprocessor-based controller board.

The Decwriter III can be used for interactive communication with a CPU, as a network unit or for any hard-copy keyboard send/receive (KSR) terminal application requiring 1,200 bit/sec reception.

Standard features of the KSR printer include a 180 char./sec effective print rate, a 1K-char. buffer to maximize throughput, an EIA interface, automatic "paper-out" switch, last-character visibility and a self-test capability, according to a spokesman.

The terminal is compatible with full- and half-duplex protocols, he said.

Optional features include a forms handling package; communications auto answer-back and identification, he added.

The Decwriter III is priced at $3,990. In quantities of 100, the unit costs $2,270, which the spokesman said best reflects the price since the Components Group does not sell single units.

In any case, deliveries will begin this summer, he said from the firm's Components Group at One Iron Way, Marlboro, Mass. 01752.

For Effective Planning

DP Principles Seen Key to Net Design

By John P. Hebert
Of the CW Staff

BOSTON — Data communications is becoming an increasingly important aspect in the day-to-day operations of the retail environment and, in the future, it will be even more important, according to Robert J. Michael of The Carson Pirie Scott & Co.

It is natural to adapt the same principles used in designing and implementing DP systems to the management of communications systems, Michael told attendees of the recent National Retail Merchants Association (NRMA) 7th Annual Telecommunications Seminar here.

In a session on "POS and Computer Data Communications," Michael said communications systems — and especially point-of-sale (POS) systems — must be properly planned, developed and implemented because they are so critical to retailers.

Michael proposed a "Systems Life Cycle" (SLC) approach to planning and implementation of future communications systems to combat the problems in their planning.

These problems have involved a lack of tradition and standards; the impact of inevitable change; a communications mystique; language barriers; lack of direction; and the abdication of concern on the part of management and systems and communications people, he said.

The suspicion and reluctance between these three groups and "the existence of this kind of environment [have] contributed to a failure...to achieve the stated goals of data communications systems," he told the retailers.

"Systems people were often 'shut out' of the management control of systems development and implementation.

"It has been even worse for the person responsible for communications," the communications project leader for the Chicago firm told session attendees.

"We've been (and maybe still are) looked at as the 'order taker' for facilities, with little involvement in the planning and control phases," he said.

CW at NRMA Seminar

The SLC approach can be used to assist the DPers in properly planning and implementing systems. Communications people must be considered an integral part of SLC, particularly in light of the trend to more communications-based systems, he said.

This management tool has three major sections: technical systems planning, systems development and implementation. But, he cautioned, it is flexible and is meant to help achieve the goals of an on-time system implementation within the budget.

If a program manager feels he can combine two or more phases, he ought to be able to prove to everyone that the end results of the combined phases have been met, Michael said.

The first phase — planning — establishes the economic and technical feasibility of a proposed project by way of the preliminary systems requirements, design and cost benefit analysis, he said.

Take a basic idea and tentatively define the scope and objectives of the proposed application to estimate costs in an initial investigation summary, Michael suggested.

If the disposition of the proposal is "go," the next step is to make a preliminary system study, giving user management a basic plan for goal and policy impact evaluation.

(Continued on Page 34)

Telenet Plans Service Expansion To 38 Additional Cities by June

WASHINGTON, D.C. — Telenet Communications Corp. is planning to expand its packet-switched data communications service to an additional 38 cities by June, pending Federal Communications Commission (FCC) approval.

Also, beginning in June, Telenet will offer a Hotline data service for its network users.

The proposed expansion will bring the number of cities served by the Telenet network to 85, the company stated.

Public dial-in facilities are scheduled to be added at four of the added service points by June. They include Sacramento, Calif.; Louisville, Ky.; and Charlotte and Raleigh-Durham, N.C.

Other public dial ports at the remaining 34 cities will be added between the third quarter of 1977 and the first quarter of 1978, the company indicated.

Hotline Data Service

Telenet's Hotline service was designed as the functional equivalent of a private-leased line. Users will pay a flat monthly rate for unlimited traffic, according to a Telenet spokesman.

The cost of the service, he said, will be independent of distance.

When a Hotline user turns the terminal on, the network will automatically establish a connection to a prespecified address, he said.

The terminal can be connected to the network through a Telenet Access Controller (TAC) or a synchronous multiconnection channel or over a single asynchronous access line.

The service will cost $50/mo, plus the normal port and access line charges, and will be available at all the 85 Telenet central offices, as well as on private TACs located on user premises, the spokesman said.

Charges for Hotline ports are $125/mo in high-density-rate cities; $160 in medium-density cities; and $205/mo in low-density cities. Hotline ports on private TACs are $75/mo.

Telenet can be reached at 1050 t7th St., N.W., Washington, D.C. 20036.

TI Announcements Include Addition to Series 700

HOUSTON — Texas Instruments, Inc. has launched a flotilla of terminals ranging from an intelligent addition to its Series 700 to a microprocessor-based system for pharmacies and a bidirectional read-only (RO) printer.

In addition to the communications-oriented product armada from its Digital Systems Division, TI brought out two floppy disk-based software development systems for users of its 990 mini/micro family (see story on Page 50).

The Series 700 Model 770 intelligent CRT terminal is based on TI's semiconductor memory technology and specifically the TMS 9900 microprocessing unit. Intended for DP and communications in distributed processing environments, it places data checking, validation and processing at the remote network site, TI said.

TI Model 770

Applications for the 770 include local reporting, sales analysis, payroll, freight scheduling and insurance claims processing, a spokesman noted.

The basic desktop unit utilizes read-only memory (ROM) and random-access memory (RAM) and has dual minicartridge tape drives, a 1,920-character CRT with a full Ascii typewriter-style keyboard containing a separate numeric pad and cursor control and programmable function key clusters, he said.

Supported by a real-time, multitasking firmware executive in the ROM, the 770's business-oriented Terminal Programming Language (TPL 700) reportedly simplifies the data entry, DP and software development functions.

Communications capabilities are optional, the spokesman noted.

Screen formats are developed under TPL 700 Forms; formats can be implemented for the terminal interactively by noncomputer trained personnel without actually programming lines of code, the company claimed.

TI's TPL 700 Procedures language for DP

(Continued on Page 37)

Let's talk about a Real Bargain

The Typewriter/Terminal
We have hundreds of ready-for-lease, or ready-for-sale terminals that have been refurbished and repriced to make them a truly outstanding bargain.

Use It as a typewriter!
Our AJ 841 features the heavy-duty Selectric IBM mechanism to give you fast, dependable operation day after day. Use it in the office. Use it at home. At our price, it's an economical typewriter.

Use It as a terminal!
The 841 incorporates our own SELECTRONIC mechanism that turns it into one of the most useful and reliable computer terminals on the market. Thousands are in operation today. Your choice of EBCD or Correspondence Codes, with APL as an option. It will interface with almost any IBM computer.

If you can use an efficient, low cost computer terminal, here's your chance to get one for about the price of a good typewriter *alone*.

If you're interested, call AJ Marketing at 408-263-8520, Ext. 280, or write for more details.

I would like to know more about getting the AJ 841 Typewriter/Terminal.

Name__________
Company__________
Address__________
City__________ State______ Zip______
Telephone Number__________

ANDERSON JACOBSON

EASTERN REGION/Hackensack N.J. (201) 488 2525 · CENTRAL REGION/Northbrook (Chicago), Ill. (312) 498 4220

521 Charcot Avenue · San Jose, CA 95131 · (408) 263 8520

Diagnostics Promoted as Critical Aspect of Networks

By John P. Hebert
Of the CW Staff

BOSTON — Communications facilities are sensitive, important and need to be maintained, Gerald Ryan, data communications manager for Allied Stores said at the recent National Retail Merchants Association (NRMA) Seventh Annual Telecommunications Seminar here.

Within the broad area of network planning, there is one small area of concern that must be included in the plans for any system — how to keep the network running once it's up, Ryan told attendees of a session on point-of-sale and communications.

"People are afraid of the subject of communications facilities," he said. "They would rather leave facilities management to the vendor because they view it as a mystical unknown.

"If the net is of value, then it is imperative [that] people are prepared to keep it running. Get a grasp of the essentiul problem of how it operates and the protocols involved," he said, echoing co-speaker Robert Michael of The Carson Pirie Scott & Co.

But he went one step further thun Michael.

Include a written procedure and the equipment necessary to isolate network faults, he suggested, noting the objectives should be simple.

"Diagnostics depend on people," he said. Designate the responsibility to keep the network operational to one person. That operator must know how to isolate faults.

Fault Areas

The basic areas where faults are likely to occur, Ryan said, may be at the hardware level — the terminals or modems — or the lines. It may also he the communications software, hut the DP people may argue this point, he warned.

In the past, if a network went down, the manager would dial 611 [for Bell repuir service], give the circuit number to the clerk, tell him to fix the problem and patiently pace, he recalled.

CW at
NRMA Seminar

But, the manager would inevitably be told the circuit was O.K., Ryan said.

"So he would call the other vendor — IBM — and the IBM employee would be first insulted by the call, then say the service representutive would look at it after returning from a day off," he mused.

"Then, at the typical rate of $10 un hour, IBM would find that their equipment was perfect.

"Now you have the assurance that your system is in trouble from two giant vendors. More often than not, the problem resolved itself mysteriously," he said.

"The lack of information is a major problem. Today you can't afford to lack the ability to resolve problems," he contended.

Basic Testing Methods

To accomplish network diagnostics, be suggested some basic testing equipment and methods from his own experience.

"Allied uses u bit error testing device which connects to a modem for monitoring the digital portions of a network on point-to-point or multipoint lines," he said.

With it, testing can proceed step-by-step in a logical sequence to isolate the network leg posing problems, he said, adding digital diagnostics are sometimes necessary when a network won't work.

There is a new device, he continued, called a Datascope, which is also a stream monitor for the digital portion. It is intended to monitor the characters themselves to isolate software failures.

Another device Ryan uses at Allied is a simple voltage level meter.

"With this equipment, we feel we are able to keep the system up," Ryan said.

"And, we, rather than the systems people, should take the responsibility to keep the system running," he concluded.

DP Principles Seen Key to Net Design

(Continued from Page 33)

The evaluation, or feasibility study, will help determine how many people are needed, what the user has to supply and a clear-cut schedule and estimated cost.

"From now on, the project plan is updated in every phase, he stressed.

The feasibility or planning study is one of the most important, he said. In a communications-hased system, the transaction types, urgency volume, growth rates and accuracy needed are involved in the plan.

"Operational management requirements, cost justification and technical factors are so interrelated that several alternative plans may he formulated and adjusted as planning proceeds."

Work with a financial analyst to come up with a cost and benefits plan which will include the manual operating cost of the proposed system, the computer cost and the development cost, he advised.

Update the plan and summarize this phase in a report for management, indicating what has been found. Make sure management approves the system proposal hefore proceeding, he added.

During the systems requirements phase, a total study of requirements is made. The factors in this phase include workflow analysis, job description, data elements definitions, constraints, controls, backup and liability procedures, he said.

The implementation planning phase answers the "hows" and is possibly the most important phase, he said. It contains a checklist for what has been done and when and who has signed-off the proposal.

The user, systems people and technical services people should get together to agree on a test schedule, Michael said, adding that up to this point, it is possible to "go back to square one, if necessary."

After a test, the system is ready to be implemented. "One word of caution: Now is not the time to make changes. If the user has a problem at this point, tell him to start with the initial investigation summary and see if it should he incorporated," he stated.

Depending upon its size und complexity, the converted system undergoes a thorough post-implementation review ahout six months later, he said.

261
Data Communications Dictionary

courier

cou-ri-er ter-mi-nal sys-tem/ 'kür-e-er, 'term-nel, 'sis-tem/ n. [Est. 1969, Phx., AZ U.S.A.]:

A versatile family of communications devices compatible with any system supporting the 3270 without application software or operating system modification. **1. The 270 Information Display System. a: Terminals**—choice of 270 Display, 278 Mini-Display, and 275 Stand-Alone. **b: Controllers** — choice of local, remote, and the new Virtual Terminal Line Controller (VTLC). Both the local and remote controllers are available in redundant configurations. The VTLC relieves the mainframe of many remote line control functions. **c: Printers** — choice of printer speeds from 100 cps to 200 lpm. **2. Superior performance.** Equipment installed throughout the United States, Canada, Australia, Austria, Belgium, France, Germany, Great Britain, South Africa, Sweden, Switzerland, and The Netherlands. **3. Reliability.** Field service support worldwide.

270 Display Terminal

Controller

Printer

Mini-Display Terminal

Courier

Courier Terminal Systems, Inc.
2202 East University Drive ■ Phoenix, Arizona 85034
(602) 244-1392 ■ TWX: 910-951-0685

DOMESTIC/INTERNATIONAL/OEM

At Courier, we know the meaning of systems.

One Modular, One Integrated

Two EFT Units for Retailers Available From TRW

LOS ANGELES — TRW Corp. has introduced two electronic funds transfer (EFT) terminals designed for retail store sites.

The modular EFT-154 and integrated EFT-115 reportedly allow a financial institution to extend its computer system to retail users' customers who want to cash checks, make savings and checking account deposits and withdrawals and loan and club payments.

Each of the terminals can give a salesperson real-time access to the status of customer credit, demand deposit and savings account files, according to TRW.

The devices provide customer identification and check verification through the use of authorization codes. Capabilities can also be established for direct transfer of funds from a customer's account to the merchant's account, as well as electronic deposits or funds withdrawal, the company claimed.

The TRW EFT-154 consists of a salesperson-operated keyboard with built-in display and magnetic card reader; a document printer for receipt validation; and a customer-operated personal identification number (PIN) pad.

Terminal Transactions

The EFT-115 combines that hardware into an integrated unit designed for use at supermarket checkout stands.

The overall system design allows EFT terminals at sales counters to share a common communications line, TRW said, adding data can be transmitted directly to the DP center using TRW programmable communications interface devices or TRW terminal processors.

The processors reportedly provide an interface for the terminals with any CPU in use at a financial institution. The terminal processor can control up to 200 EFT terminals in a maximum of 20 different locations, the company added.

A typical EFT-154 system capable of serving one store includes two keyboards, printers and PIN pads plus the programmable communications interface device and is priced from $6,000.

Prices for an EFT-115 system with the programmable communications interface, placed in a typical supermarket with eight checkout stands, start at $11,000.

TRW is located at Suite 620, 9841 Airport Blvd., Los Angeles, Calif. 90045.

COI Controller Replaces IBM 3271

BETHEL, Conn. — Computer Optics, Inc. (COI) has brought out a direct replacement for the IBM 3271 remote terminal controller which can handle up to 16 devices, a spokesman said.

Expanded Version

The microprocessor-based CO: 8271-2 is an expanded version of the company's CO: 8271-1 minicluster controller. It can control interactive CRTs or printers in any combination, COI claimed.

The 16-terminal controller is available with IBM's Synchronous Data Link Control (SDLC) or Binary Synchronous Communications (BSC) protocols, the spokesman added.

The CO:8271-2 costs about $12,000. COI is at the Berkshire Industrial Park, Bethel, Conn. 06801.

Salesperson gets ready to initiate transaction on TRW EFT-115.

NCR Links Registers With Mainframes

DAYTON, Ohio — NCR Corp. has developed a communications utility package to link NCR mainframes with the company's Model 250 electronic cash registers.

The NCR Century/Criterion Communication Utility (CCU) is a self-contained utility which works with 250 models equipped with a data capture cassette and polling feature, NCR said.

An NCR CPU can automatically dial up the terminal over the switched network and record the information from the cassette to disk for subsequent processing.

The CCU software eliminates the need for initial polling by a minicomputer.

It works with any Century 101 or larger system and all Criterion systems. The minimum requirements are a 32K processor, twin disks, a card reader, communications multiplexer and associated adapters and modems.

The CCU, available for immediate delivery, has a $125/mo license fee, the spokesman noted from Dayton, Ohio 45479.

Controller Lets Tally Printer Emulate Remote Stations

KENT, Wash. — A microprocessor-based communications controller for Tally Corp.'s Series 2000 line printers reportedly emulates IBM, Control Data Corp., Univac, Honeywell Information Systems, Inc., Burroughs Corp. or any other remote print station.

The Tally communications interface provides for synchronous or asynchronous data transmission on full- or half-duplex point-to-point or multidrop lines.

It is capable of speeds up to 9,600 bit/sec, 1,000 character single or double buffering, full error correction and Ascii or Ebcdic code transmission, according to the firm.

Equipped with the communications controller, the Tally 2000 sells for $7,160. Typical one-year rental rates are $430/mo, including maintenance, Tally said from 8301 S. 180th St., Kent, Wash. 98031.

New KODAK KOM-85 Microfilmer.

More flexible, more capable, and reliable as ever!

When you set out to improve a COM workhorse, you don't tinker with the features that made it an outstanding performer. The advanced KODAK KOM-85 Microfilmer gives you new flexibility and capability, combined with the fast, efficient throughput and high reliability of our proven veteran, the KOM-80 Microfilmer.

If your operation calls for high volume with fast turnaround, you should check into the advantages of the new KOM-85 Microfilmer.

The advanced Hewlett-Packard front-end mini-computer gives you automatic program loading and integrated job setup through a CRT data terminal. You get input flexibility to accept print-image records from virtually any computer system. Faster job setup, easier film handling.

The KOM-85 Microfilmer gives you multiple-microform-output capability, plus a new expanded page format with up to 172 characters per line and up to 88 lines per page. You get broad coding and indexing capability for roll or fiche. Optional document-related coding for automatic retrieval on 16 mm KODAK ORACLE Equipment. Flexible column indexing for fiche, and more . . .

It adds up to more flexibility, new capabilities. With throughput speed up to 24,000 pages per hour. And the extra-reliable Kodak hardware and comprehensive software to handle COM formatting.

There's even more behind your new KODAK KOM-85 Microfilmer. Thorough training and clear, complete documentation; fast, competent, on-the-spot service; responsive and responsible support from dedicated Kodak people —the kind of support that's helped us set an outstanding nine-year track record in COM.

Look into the new KOM-85 Microfilmer. See your Kodak representative, or write Eastman Kodak Company, Business Systems Markets Division, Dept. DP-66873, Rochester, N.Y. 14650.

Since you demand a lot
from EDP, demand the
same from COM.

Kodak

Computek Series 200 Enhanced

BURLINGTON, Mass. — Computek, Inc. has enhanced its Series 200 user-programmable terminal system with a floppy disk operating system (FDOS) and a 64K-byte memory.

The Series 200 FDOS includes a diskette macro assembler, source text editor, linker loader, two screen-oriented debuggers and a library of utility programs.

The heart of the system, according to the firm, is the FDOS Kernal Program, which provides a link between all systems programs and the FDOS so users do not have to reprogram the terminal system as long as power is available.

Two levels of diskette drivers are provided with FDOS. The basic level of physical drivers will read, write, pack and unpack records from the disk addressed by drive, track and sector number, Computek stated.

Logical drivers provide automatic updating of the file directory as well as OPEN, CLOSE and CREATE commands, it added.

FDOS will run on stand-alone or clustered Series 200 configurations and requires 16K bytes of memory.

Terminal Transactions

A single-station stand-alone Model 200/10 FDOS terminal system with CRT/keyboard processor, 32K bytes of memory and two floppy disk drives is priced at $11,230.

A clustered Model 200/40 (four-station) FDOS configuration is priced at $18,555 or $4,640 per terminal.

Computek also offered a 64K-byte memory for the Series 200 terminals, doubling the current maximum, a spokesman explained.

The memory is available in 8K-byte blocks of read/write random-access MOS memory; up to 4K bytes can consist of read-only or programmable read-only memories, he added.

Computek is at 63 Second Ave., Burlington, Mass. 01803.

IBM 3604-5, -6 Can Now Handle Magnetic Codes

WHITE PLAINS, N.Y. — Magnetic stripe encoding/reading is now available for models 5 and 6 of IBM's 3604 finance communication terminal, extending the feature to all 3604 models.

Designed to boost teller productivity by reducing keystrokes, the device reads customers' magnetically encoded passbooks when they are passed through a slot in the machine's surface.

Withdrawals and deposits are entered through the keyboard. When the transaction is finished, the passbook is automatically updated with the encoder/reader, according to an IBM spokesman.

The enhancement also can read bank cards that use American Bankers Association Track 2, a 75 bit/in. magnetic code used for credit data, he said.

The price of the feature, which can be field-installed, is $28/mo under IBM's Alternative Term Plan. It can be purchased for $775.

First shipments are scheduled to begin in August from IBM's Data Processing Division at 1133 Westchester Ave., White Plains, N.Y. 10604.

Units Get Keyboard

MINNEAPOLIS — Research, Inc. has added a detached keyboard and a separate readout monitor to its Teleray terminal series.

The detached keyboard configuration is available as an option on the upper case Model 3541, the upper/lower case Model 3741 and upper/lower case Model 3841.

The detached keyboard option is priced at $50 or $2/mo. With a numeric pad, it costs $100 to purchase or $4/mo on lease.

Readout monitors are priced at $100 below the single-quantity purchase price of each terminal, the company's Teleray Division said from Box 24064, Minneapolis, Minn. 55424.

CDC Adds Plato Terminal

MINNEAPOLIS — Control Data Corp. has introduced a low-priced education terminal that reportedly features increased reliability and options.

The terminal is intended for use with the firm's Plato computer-based education system and costs 23% less than the previous Plato terminal; maintenance costs are 66% lower, according to CDC.

A primary feature is a touch-screen response capability. Questions can be answered, images moved to different areas of the screen and new images displayed by the pressure of a fingertip.

Purchase price of the Plato terminal is $6,800, regardless of quantity ordered, compared to $8,800 previously. The touch-screen capability and a local interface modem are included in the purchase cost, the spokesman said.

The terminal is also available on a lease basis, with the monthly rates reflecting quantities ordered, the spokesman noted from CDC at Box 0, Minneapolis, Minn. 55440.

The 36-bit DEC

Lots of people outgrow minicomputers. Nobody outgrows Digital.

You can outgrow minicomputers without outgrowing the world's leading minicomputer company.

Because Digital Equipment Corporation also makes big computers.

The mighty, 36-bit DECsystem-10's.

The new 36-bit DECSYSTEM-20's.

And, thanks to the DECSYSTEM-20, your first step into big computers doesn't have to be a big step any more.

You can have one for a total systems cost starting at under $10,000 a month.

The key to this amazing price-performance is that the DECSYSTEM-20 combines the high performance hardware and economy of our famous minis with the powerful, dependable software of our pioneering DECsystem-10's.

With that as a base, we went on to give you other great things.

Virtual memory so you can run programs up to a million bytes long without running out of core.

Some really fast hardware for truly mammoth throughput: ECL logic for the mainframe and 160 nanosecond cache memory. Both of which are made practical thanks to our exclusive Computer Controller Operation (CCO) — a built-in minicomputer that handles all the unit record peripherals, terminals, communications, system monitoring, remote diagnostics, and allows system changes to be made on-line.

Streamlined versions of all the DECsystem-10 database software and compilers for COBOL, FORTRAN, APL (both Large and Small), a P/L I subset, BASIC PLUS 2, and ALGOL.

Concurrent multi-stream batch and interactive operation for up to 128 users.

Software that's totally compatible with our larger DECsystem-10's.

The 36-bit DECSYSTEM-20.
Digital takes you all the way.

☐ Please send more information.
☐ Have a salesman call too.

Name ______
Title ______
Company ______
Address ______
City ______
State ______ Zip ______
Telephone ______

Send to:
Digital Equipment Corporation,
200 Forest Street, Marlborough, MA 01752.
Phone: 617-481-9511, Ext. 6885.

MRI-1 M/55 CW-3-21

digital
LARGE COMPUTER GROUP

TI Introductions Include 'Smart' Series 700 Addition

(Continued from Page 33)

applications supports structured programming and features a logical I/O capability allowing an operator to access files by name.

In addition to these features, an IBM 3780 emulation package reportedly provides direct communications with an IBM host CPU using the Binary Synchronous Communications protocol.

TI Silent 700 Model 742 terminal and Teletype Corp. communications, protocols are also available for the 770, as is a TI terminal polling system (TPS) for data collection and distribution, according to the firm.

Model 770 options include RAM expansion from the basic 8K to 24K bytes, an integral Silent 700 30 char./sec nonimpact printer (the 770/2) or a 150 char./sec Model 810 RO printer, and display graphics, communications interfaces, modems and automatic calling units.

Internal modem kits, also available as options, allow asynchronous communications to 1,200 bit/sec with Bell 202T- and 202S-compatible modems, as well as synchronous transmissions at 2,400 bit/sec from Bell 201C-compatible devices for operation on the dial network or leased lines, TI stated.

Interface kits for external modems are also optionally available for asynchronous operation at 300- and 1,200 bit/sec and transmissions at either 2,400- or 4,800 bit/sec synchronously.

The basic 770/1 without printer costs $6,400 or $220/mo on a one-year lease; maintenance is priced at an additional $72/mo.

Model 911

The 770/2 with the 30 char./sec thermal printer costs $7,500 to buy and $300/mo to rent on a one-year lease; maintenance costs $87/mo.

Internal modem kits range from $1,065 to $2,075, while the interface kits cost $530 to $925.

TI's microcomputer-based pharmacy system was designed to operate on-line to a host CPU.

The Model 400 features the Model 911 CRT, a Model 810 impact printer and a Model 990/4 microcomputer with up to 56K bytes of memory.

The terminal system reportedly supports up to four CRT workstations and two printers. Internal modems or an external Bell data set interface provide both synchronous and asynchronous communications between the Model 400 and the host, TI claimed.

Terminal system software consists of a memory-resident operating system with what is said to be extensive CRT management capability and communications support.

Terminal Transactions

The pharmacy system costs $7,075, with quantity discounts available. Delivery will start in the second quarter.

The Model 911 is intended for use with the TI 990 mini/micro computer family and consists of a CRT, separate keyboard and a controller which mounts in a 990 CPU chassis.

It is available in either 960- or 1,920-character screen versions for display of 5 by 7 dot matrix characters, TI said.

An arrangement of refresh memory mounted on the controller with the video signal transmitted through coaxial cable from the computer display offers high transmission rates and low-cost cabling, TI claimed.

The configuration also is said to conserve memory on the mainframe. The CRT and keyboard can be located up to 2,000 ft from the 990 CPU, TI added.

The 1,920-character version is priced at $1,700; deliveries will begin in July.

Model 810 Impact Printer

The Model 810 RO printer operates at 150 char./sec and can be used as an I/O device for minicomputer and microprocessor systems, for auxiliary forms printing for intelligent CRTs and as a remote office output printer in a communications network.

The 132-column Model 810 is a multicopy device with bidirectional printing. Effective throughput of the 810, TI claimed, is from 60 line/min at 132 columns up to the maximum of 440 line/min at an average 10 char./line.

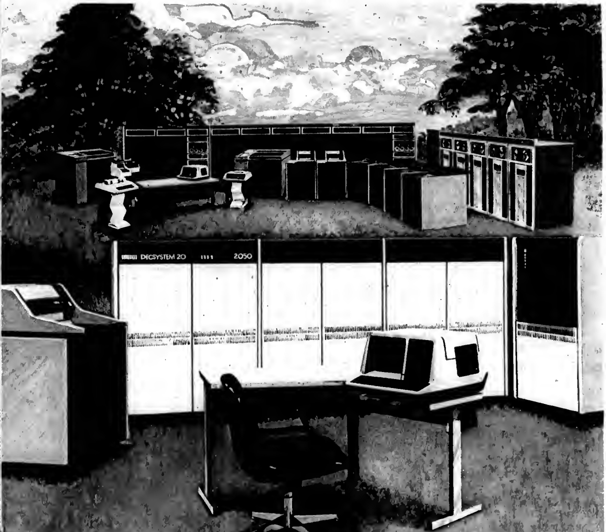
Standard features include a 64-character Ascii set in a 7 by 9 dot matrix print format, a 256-character communications buffer, a self-test feature and an adjustable tractor drive for forms from 3- to 14-7/8 in., the company said.

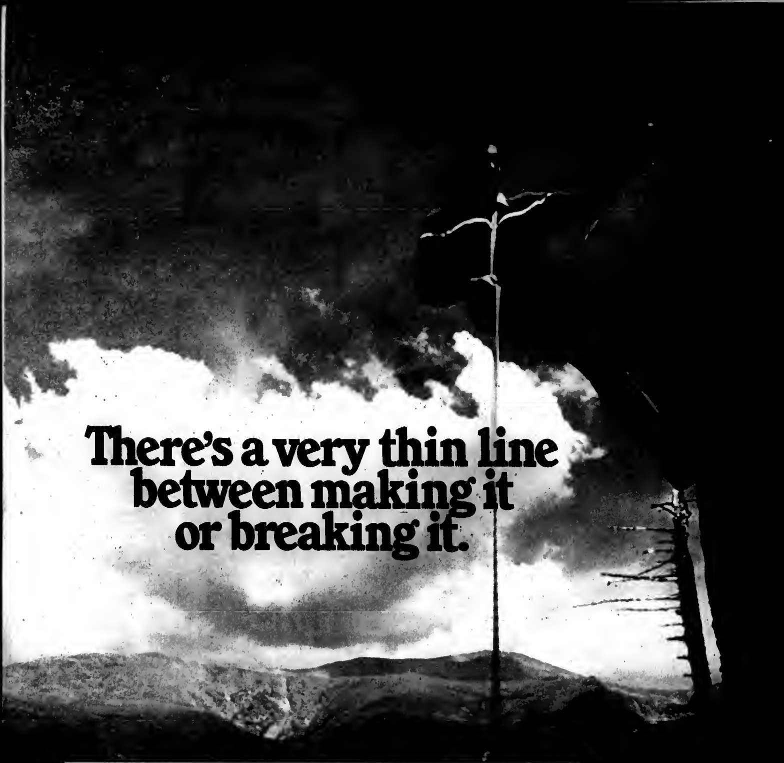
Optional features include the full Ascii set, compressed character printing and 11 forms lengths for standard forms usage or vertical forms control.

Deliveries of the Model 810 are scheduled for April. The basic 810 costs $2,250.

TI's Digital Systems Division can be reached at P.O. Box 1444, M/S 784, Houston, Texas 77001.

SYSTEM-20.





That's important to remember with high-density drives.

The advantages to 6250 CPI recording — like higher data transfer rates and a reduction in library size requirements — are numerous.

But there are also some disadvantages. One of them is the masking by the GCR format. Because of it the only way to get an accurate error listing is through sense byte interrogation. Ask your Graham product technology man why.

Because of unnoticed errors serious degradation in read/write reliability can occur. This is compounded by debris from bargain-priced computer tapes, which don't have the modulus of toughness and durability of Epoch 4.

Get certified error-free Epoch 4. It makes all the difference. Now — and for the future.

GRAHAM MAGNETICS
Graham, Texas 76046

Study Finds COM Doesn't Reduce Paper Use

WALTHAM, Mass. — The use of computer-output microfilm (COM) does not decrease the paper volume produced by the central computer, according to a study by the International Data Corp. (IDC) here.

In fact, the study found, the paper and COM film volumes continue to increase yearly at most user sites. The COM output in some cases is not reducing output, and there are new or archival type applications that were never printer-oriented, IDC said.

The study, "The Computer Output Microfilm Market," was based on a survey of 157 COM users across the nation and identified patterns of COM use to determine whether COM output is in competition with other output media.

Total volume of output at central sites will increase from 122.5 billion original pages in 1975 to 277 billion pages in 1980 as a result of growth in paper and COM output, the report predicted.

There were 2,200 COM recorders installed in the U.S. at year-end 1975. By year-end 1980, there will be 5,200 installed, IDC said.

By 1980, 24% of the estimated 110,900 general-purpose computer sites will use COM compared with 18% of the 1975 figure of 59,500 sites.

The average in-house user, which currently represents two-thirds of the current COM sites, has one recorder, operates 48 hour/week and produces 6.6 million original frames and 42 million duplicate frames.

The average service bureau, which will represent only 30% of the predicted 1980 installations, has two recorders, each of which is operated 90 hour/week, and produces 28.7 million original frames and 180 million duplicate frames.

COM users in general produced a total volume of 20 billion original frames and 127 billion duplicate frames at year-end 1975, according to the report. By 1980, the report forecast, the total volume will reach 54 billion original and 334 billion duplicate frames, more than double that of 1975.

Some of the user preferences noted in the report included faster COM recorders with improved software, the ability to use a 6,250 bit/in. tape drive in the future and recorders that are easy to operate, such as those with in-line film processing.

Rain or Shine, 370 User Prepared

PITTSBURGH, Pa. — Faced with the possibility of spring floods, Gateway Data Systems here moved its IBM 370/125 plus peripherals from the basement of its building to the 17th floor with only 8.5 hours downtime.

Floods were predicted as a result of the severe winter [CW, Feb. 14] that had solidly frozen the Allegheny, Monongahela and Ohio rivers and dumped huge depths of snow in the area.

"We were faced with the possibility of having to move out of the building at a minute's notice, so we decided to move to higher ground on the 17th floor of our building. We planned a temporary move now, with a move to other permanent quarters on the 17th floor at a later date," according to John Weaver, president of Gateway's parent company.

Normally, the moving of a computer facility requires a great deal of planning for the electrical power distribution system as well as a period of a week or longer to do the hard-wiring of the room.

Power Distribution System

"We couldn't afford to be out of business for 24 hours, let alone weeks," Weaver said. So, to circumvent the time-consuming hard-wiring of the new room, Weaver purchased a portable power distribution system, the Computer Power Center (CPC), from Computer Power Systems Corp. of Costa Mesa, Calif.

The CPC, which required only a single hookup to the main building wiring, performs all of the necessary power distribution to the various elements of the system through shielded flexible conduits.

It not only distributes the power, but isolates the computer system from any transients or other disturbances in the building wiring through the use of an electrostatically shielded, computer-grade isolation transformer, a manufacturer representative noted.

Configuration changes using the CPC generally require nothing more than moving the flexible circuits from one location to another, he added.

"The isolation aspect of the Power Center was important to us," Weaver said. "When we were in the basement, we could hook up directly to the mail line from the power company.

"On the 17th floor, we need isolation to protect our system from the other disturbances that we would have to live with if we just plugged into the normal building wiring."

The all-IBM Gateway system consists of the 370/125, several 3340 disk drives, a 1403 printer, a 2501 card reader, a 1442 card punch, a 3881 optical mark reader and several 3270 CRTs.

"We have a current power usage of 17.78 kV, hut we ordered a 45 kV CPC because it gives us the flexibility to expand our system at a later date with little or no pain with re-

(Continued on Page 42)

Also Lowers Costs

Independent Gear Speeds CPU Services

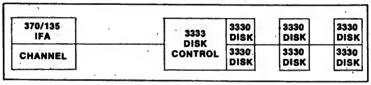
DENVER — The State of Colorado Judicial Department, which initially implemented computerized operations in 1967, recently found a way to speed service to system users while lowering operational costs.

The predominately on-line IBM 370/135, which supports remote terminal communications between the system and various court clerk offices and the attorney general's office, was enhanced with the installation of an independent's magnetic disk drive and telecommunications control subsystems.

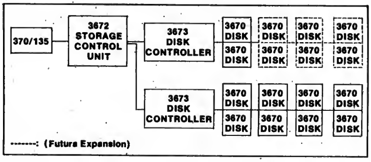
The previously used disk system had an IBM storage facility with storage control functions shared between the Integrated File Adapter (IFA), resident in the CPU, and IBM 3333 storage control units integrated with the lead dual modules of 3330 disk files.

The switch to independent equipment involved the substitution of an external Memorex 3672 storage control unit for the IFA. Connected to the 3672 unit is a pair of Memorex 3673 disk controllers, each supervising a string of Memorex 3670 Model 1 disk storage modules.

Using the Memorex equipment with the IBM 370/135 has lowered the department's net rental cost for both peripheral systems, speeded access to disk-stored information by 10%, improved the monitoring of subsystems operation and cut CPU response time to terminal-initiated requests by an average of 67%, a Memorex spokesman said.



Judicial Department's Previous All-IBM Configuration



370/135 After Installation of Memorex Gear

The changeover has additionally given the courts an ability to expand to four 3673 disk controllers each with eight double spindle modules of 200-million (or 400-million double density) capacity versus a maximum of two 3333 disk controllers and 16 dual module disk devices.

As with the disk subsystem, the Memorex 1270 terminal control unit, used by the department to control communications between the CPU and 43 CRTs, eliminated the use of an integrated communications adapter with the 370. Internal machine cycles were freed and, despite the extra external control unit, net rental is down slightly, the spokesman continued.

The average response time for data to appear on a terminal once a request is keyed down from 15 to 5-sec, he added.

Among the data bases now established by the Colorado Judiciary are a court system for name index calendar and register of actions; alimony and support; motor vehicle registry, fees and fines; bonds; probation and jury selection.

Techniques of Data Compression Can Prolong System's Life Span

By Richard Haasz
Special to Computerworld

When examining data compression, two questions generally come to mind: Are the needed machine cycles justified by the few fields containing repetitive characters to be squeezed out? Is the programmer familiar with handling the variable-length records that inevitably result from this space-saving technique?

On the surface the problems of data compression appear to outweigh the benefits. This is probably the result of thinking of data compression solely as a space-saving technique.

But as a technique which is very easy to use, data compression can contribute substantially to the life span of most computer systems.

Data compression is not the proverbial fountain-of-youth sought after by DP managers. Nevertheless, it is a fact of life that many systems die prematurely when their files are no longer adaptable to changing requirements (e.g., new fields which are longer than any free space in the record, increases in field lengths that necessitate massive programming changes, fragmented dead space from fields that are no longer needed).

Any technique that can increase the life span of a system means more payback from the initial development expense and a postponement of the cost of reimplementing the system.

The programmer learns early in his career that the cost of file space is at a premium and must be managed frugally. As he progresses to systems design, we find him packing data into codes, packing his numbers, questioning the necessity of each byte in a

(Continued on Page 42)

132-Column CRT Interactive

SAN DIEGO — A 132-column by 30-line CRT has been introduced by Datagraphix, Inc.

The terminal, which has an 8.5- by 11-in. screen, has full functional interactive I/O compatibility with DP systems, according to a spokesman.

The Datagraphix 132A uses a Charactron tube in which the electron beam is transmitted through a "stencil" which contains the character set. As the beam passes through the stencil, the entire character is produced on the screen.

The unit is controlled by an Intel Corp. 8080A microprocessor. It offers a 96-character Ascii set, 60- or 120-line buffer, cursor control, single-line editing, tabbing, scrolling, dual brightness, multiple asynchronous transmission modes at 110- to 9,600 bit/sec in full- or half-duplex mode and RS-232C output to 132-column serial printers.

The 8080A permits future extension capabilities, the spokesman said.

The basic unit, with an 8K huffer memory with 16K optional, costs $3,950. Delivery will begin in August, the firm said from P.O. Box 82449, San Diego, Calif. 92138.

To the VP of manufacturing who'd rather be on-line instead of on-the-carpet:

From the desk of the President:
Let's discuss inventory variances Tommorrow 8:30 AM
K.F.

An on-line inventory management system is a nice thing to have when you need answers in a hurry. Especially if the system gives you the controls you need to make sure the answers are not full of surprises.

To our V.P. of manufacturing, such a system is more than a nice idea; it's absolutely essential. By being on-line to an interactive, multiuser Prime computer programmed to handle Prime's specific needs, he has everything under control. Last year, for example, the system helped his organization control the variance between physical and book-value inventory to less than 0.1%!

So if you've been spending too much time on the carpet explaining variances more like 5%, a Prime computer can help you control your inventory as tightly as our V.P. controls ours. In fact, the money you'll save by reducing your variance will no doubt pay for the complete system.

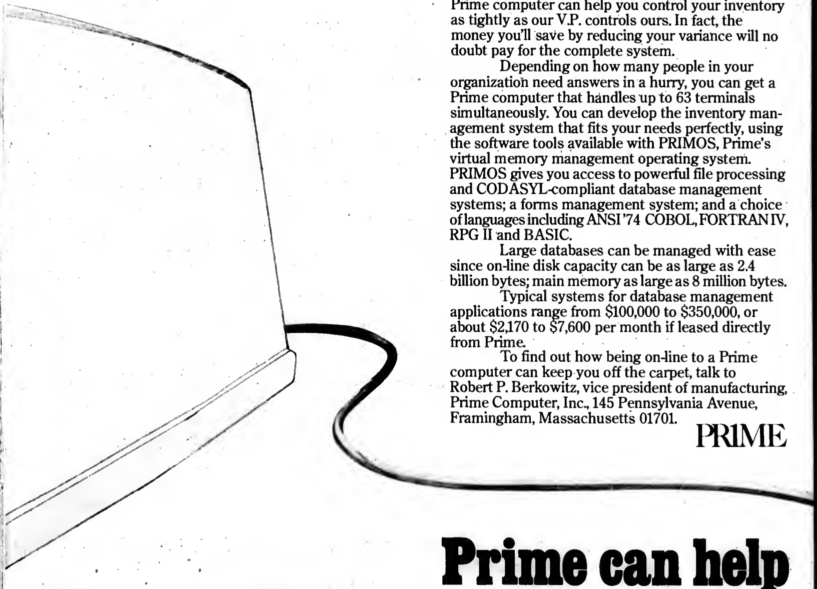
Depending on how many people in your organization need answers in a hurry, you can get a Prime computer that handles up to 63 terminals simultaneously. You can develop the inventory management system that fits your needs perfectly, using the software tools available with PRIMOS, Prime's virtual memory management operating system. PRIMOS gives you access to powerful file processing and CODASYL-compliant database management systems; a forms management system; and a choice of languages including ANSI '74 COBOL, FORTRAN IV, RPG II and BASIC.

Large databases can be managed with ease since on-line disk capacity can be as large as 2.4 billion bytes; main memory as large as 8 million bytes.

Typical systems for database management applications range from $100,000 to $350,000, or about $2,170 to $7,600 per month if leased directly from Prime.

To find out how being on-line to a Prime computer can keep you off the carpet, talk to Robert P. Berkowitz, vice president of manufacturing, Prime Computer, Inc., 145 Pennsylvania Avenue, Framingham, Massachusetts 01701.

PRIME



Prime can help

OBM Enhances OCR System

MELBOURNE, Fla. — Optical Business Machines, Inc. (OBM) has unveiled a 600 char./sec matrix printer option for its Laser OCR-ONE optical character recognition (OCR) system.

The PB-600 can be utilized to print such things as original or edited information as the data is scanned; listings of errors that might occur while scanning; and batch information such as batch totals, record counts or document counts, OBM suggested.

The Laser OCR-ONE with its printer can also be used as an off-line print station for tapes prepared elsewhere, OBM said.

The printer is manufactured by Florida Data Corp., an affiliate of OBM.

The PB-600 printer costs $7,000; lease terms are available, OBM said from 804 W. New Haven Ave., Melbourne, Fla. 32901.

erisa?

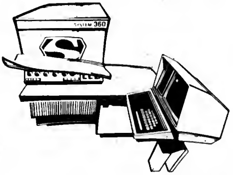
If the personal penalties for management violation of the Employee Retirement Income Security Act of 1974 have you worried, then take heart.

Wang has 360/370, Burroughs, Honeywell and Univac, ERISA software, designed, installed and running, coast to coast, safeguarding the pensions of more than one million workers and protecting the careers of their managers.

For more on ERISA, call Joe Nestor (617) 851-4111, Wang Laboratories, Lowell, MA 01851. In California, call Carl Tarescio (714) 631-0138.

WANG

The Dearborn S/360.
It's not like leasing an ordinary mortal machine.



The S/360 machines from IBM are good.

The S/360 machines from Dearborn are super!

We give them power beyond that of ordinary machines. Six partitions instead of three, for example. Support for full-speed 3330's, CRT console support, load balancing, resident transient and directories, disk chained fetch, warm-start support and job accounting and measurement reports.

You don't have to have all this super performance: you can start with a 6 to 10K spooler that will leap over production bottlenecks instantly.

There's even 1400 program simulation on the Dearborn 50's and 65's.

Transforming an *ordinary* S/360 lease into a *Dearborn* S/360 lease is easy. Just step into the nearest phone booth and call us.

YES . . . we also lease and sell Super 370's

dc dearborn computer leasing company
hardware 360's/370's
systems software
brokerage
chicago 312/671-4410 • toronto 416/621-7060 • st. louis 314/727-7277

Users Can Enhance System Life With Data Compression Methods

(Continued from Page 39)

field and trying to justify the existence of each field.

Often, the ultimate user of the system must argue the need for data space for the infrequently occurring data item. Then comes the agonizing decision on how much empty space is to be left in each record for future expansion.

This situation is necessitated by the fact tha the record as viewed from the program, is the same as the one taking up space in the file — it is the real record.

Virtual Records

The concept of a "virtual record" separates the attribute of length of the record in the program from the length of the record in the file. With data compression, the record on the file is only as long as its data requires.

The data in the program appears to be much longer, having multiple occurrences of repeating fields established generously and accumulators large enough for huge amounts.

Imagine, for example, a payroll master record with 20 deduction segments, each 60 bytes long; year-to-date fields defined to hold millions of dollars; name fields long enough for William Somerset Maugham and address space for six lines of 40 bytes each; filler for future expansion in the order of hundreds of bytes, in generous pools and at the end of each record.

Only the read and write routines see the real record because they contain the calls to expand and compress, respectively; the rest of the program deals only with the expanded, fixed-format, virtual record. All filler, of course, is cleared to spaces or low values to allow compression.

Numeric fields with long strings of leading zeros are easily compressed, thereby encouraging the use of large numeric fields. Name fields with trailing spaces are easily compressed, thereby encouraging the use of large name fields.

Importance of Layout

By designing record layouts with generous field sizes, the file will not prematurely strangle the system because of heavy inflation increasing field dollar values beyond the imagination of the designer. Nor will persons with long names have to settle for truncated variations to save a few extra bytes in everyone else's record.

Address need not be handled by a variable number of segments technique: eight lines can be allocated in the virtual record and only as much space will be needed as the data on those lines dictate. Entire record segments can be included in the virtual record design and left unused until a later approval to collect and record it; just initialize it to spaces and it will be compressed out.

A dozen extra amount fields can be included for future use on the slightest justification, set to low values and all compressed out of the real record. A hundred bytes of filler at the end of each record, initialized to spaces, reserves space in every program for additional data elements to meet future requirements — set to spaces and watch it get compressed out.

When changing requirements remove the need for a data element, just clear that field in every record and it will be compressed, thereby reducing the file size.

There are various compression techniques, each involving trade-offs in computer cycles and file space. My preference is for callable subroutines (one to compress and the other to expand) which compress out only the spaces and low values (nulls).

This technique copies a data record replacing strings of spaces and low values with a two-byte control block, thereby shifting data to the left. The first byte of the control block is a low-value byte to identify this as a control block for the expansion routine. The second byte uses the first bit to signify spaces or low values and the other seven bits for the string length.

If one control block cannot represent a string because it is too long, then another control block follows it, each representing up to 127 spaces or low values. This technique permits all special characters to exist in the record.

Obviously, a single occurrence of a low value must be converted to a control block (having a length field of 1) to avoid being mistaken for a control block at expansion time. The compression and expansion subroutine calls are placed into the write and read routines, respectively, so all other parts of any program see only the fixed-format expanded record.

Because the subroutines deal with the entire record, they do not need to know any of the attributes of any individual field. Only the record and its length are passed to each subroutine; only a record and its length are passed back.

The benefit of compression is not to save a few bytes here and there in a tightly defined system, but rather to take away the necessity for tightly defining our systems. We no longer have to justify the inclusion of data elements or segments in a file layout nor justify their size. The era of tightly defined systems is over.

Haasz is a senior systems analyst with the Office of Computer Services and Information Systems for Metropolitan Dade County, Florida.

Fairchild Offering CCD Memory Sample

MOUNTAIN VIEW, Calif. — Fairchild Camera and Instrument Corp. has unveiled a 64K-bit charge-coupled device (CCD) block-addressable memory. Fairchild will be aiming the product at the bulk memory market, such as drum and disk.

"The 64K CCD memory is the first semiconductor device suitable for the bulk memory market, which is four times the size of the computer mainframe market," according to a Fairchild spokesman.

Potential Customer Influence

parameters were heavily influenced by potential customers, and the device meets the requirements of every bulk memory application we have encountered," he added.

The memory is organized as 64K by 1 bit. Internal architecture divides the memory into 16 blocks of 4K bits each.

Typical data rate is 5 MHz, with average retrieval time for an average bit of 400 microsec. Power dissipation is less than 5 microwatts per bit in active mode and less than 1 microwatt in stand-by. The device is packaged in a standard .300-in. 16-pin DIP, he said.

Samples of the memory will be available in the second quarter for $96.61 from the firm's MOS/CCD Division, 464 Ellis St., Mountain View, Calif. 94042.

Flood Threat Causes User to Move CPU

(Continued from Page 39)

gard to supplying power. We change something in the facility at least two or three times a year. We can finally grow and change with relative ease," Weaver said.

To meet the needs of the potential disaster, Computer Power Systems received the order from Weaver on a Friday and shipped the unit on Monday; Gateway was up and running a few days later, Weaver said.

A spokesman for the Weather Service here noted that the greatest danger is now over, but Gateway's move was probably a smart one because of the extremely short notice it would have received had a flood become imminent.

Here's how Data General's NOVA 3/D system stacks up against the competition.

Systems Software:
Multitasking real-time disc operating system, FORTRAN IV, Extended BASIC, ALGOL, SORT/MERGE, and Utilities.

NOVA 3/D Processor:
Hardware-protected dual partitions, 700-nanosecond arithmetic operations, 48K-word MOS memory with parity, RTC, and APL.

Video Display:
1920-character screen, upper/lower case characters, detached keyboard, numeric keypad, programmable function keys and character highlighting, display rotates on two axis.

Cabinet:
72-inch high, holds all rack mounted components.

DASHER Terminal Printer:
60/30 cps; 132-columns; typewriter keyboard, upper/lower case.

Diskette Subsystem:
315KB for program/data interchange, diagnostics and software distribution; convenient, industry-standard offline storage.

Cartridge Disc Subsystem:
10 megabytes (5 fixed, 5 removable); 50 ms. average access time, shares controller with diskette.

$37,610
List*

The facts speak for themselves. For $37,610, Data General's new NOVA 3/D gives you more system, software and support than any comparable computer. And we deliver in 60 days.

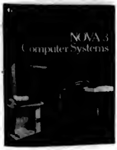
Any way you look at it, it all stacks up in your favor. For more information and our brochure, call or fill out and return the coupon.

*Quantity and OEM discounts available.

Data General, Westboro, MA 01581
Sounds like smart business. Send me more information.

NAME
TITLE
COMPANY
ADDRESS TEL.
CITY STATE ZIP

NOVA is a registered trademark of Data General Corporation.
DASHER is a trademark of Data General Corporation.



Data General
It's smart business.

Data General, Westboro, MA 01581, (617) 485-9100. Data General (Canada) Ltd., Ontario. Data General Europe, 15 Rue Le Sueur, Paris 75116 France. Data General Australia, Melbourne (03) 82-1361.

In-House Printing of Fabric Tags Helps Apparel Maker Meet Law Efficiently

N. KANSAS CITY, Mo. — A men's clothing manufacturer here has combined modern forms technology with the speed of a line printer to efficiently comply with federal law concerning labeling of fabric content.

The Lee-Wald Co. is using Communicolor forms designed by the Standard Register Co. and a Univac 9200 with a 250 line/min printer to produce the federally required price/content tags.

Formerly, the fabric content tags were produced by an outside commercial printer, a spokesman said. This required that Lee-Wald supply the copy so the printer could prepare the plates to print the individual tickets.

Because the information changed frequently, printing runs had to be interrupted for plate changes, turning the process into a series of short press runs, he noted.

Consequently, the firm had to estimate the number of tags it would need to meet its sales. A high estimate wasted tickets and a low one required a rerun — both of which were expensive and wasteful.

The firm wanted better control and the ability to prepare the tags based on final and accurate sales figures. "The computer was the answer and the form is the medium," William Kay, Lee-Wald's vice-president, remarked.

Tags roll off the printer.

"We realized we could combine the content ticket with the one that carried size and lot number information.

"The operation was handled on our premises, but it was a slow procedure and by combining it on the computer with the other ticket; we could reap benefits in both applications."

The document Lee-Wald now uses is a one-part form printed three forms wide on coated paper with a small die-cut hole top center. The main section carries the size and lot number information along with the description of the fabric content.

Immediately beneath that information is the Lee-Wald logo and address. The price information section can be separated from the other along a perforation.

Lee-Wald can now hold off preparing tickets until the last possible moment. The firm waits until the sales figures are final and the production run is then scheduled, the spokesman explained.

Where it formerly took several weeks for an outside printer to handle this job, Lee-Wald now covers a full season's production in a single day, he said.

"An attractive form, a simple system combine to save us time, money and aggravation. No waste, no shortages, just speed and accuracy. It all adds up to efficiency," Kay said.

Versatec Offers Ink-Free Plotter

By Esther Surden
Of the CW Staff

SANTA CLARA, Calif. — Is your pen plotter slow and costly? Do the pens run out of ink and ruin the whole plot?

Have you thought about going to an electrostatic plotter; but dismissed that alternative because you can't find one wide enough for your application or those available won't work with your IBM 360/370 system?

Fear no more, according to a spokesman for a firm here that makes — you guessed it — electrostatic printers.

"Until recently electrostatic plotters were not wide enough to be very useful to the mainframe user," a spokesman for Versatec, Inc. said.

But this is no longer the case. Versatec now makes an electrostatic plotter up to 72-in. wide, he noted.

Electrostatic plotters are about half the cost of flat-bed plotters, he claimed, although special paper is needed to operate them and some attention must be paid to filling the systems with toner.

A recent software development effort — resulting in a device called a vector processor — has allowed the firm to offer software conversion facilities for mainframe users.

The vector processor takes the vectors of a pen plotter and translates them into rasters for the electrostatic system, he explained.

743 KSR terminal...$1,395.
Uncompromising *Silent 700* quality...
at an unprecedented price.

The new *Silent 700*® Model 743 KSR data terminal is the lowest priced 30-cps printer terminal available today. And, true to its heritage, it combines all the popular *Silent 700* performance features . . . speed, reliability and quietness.

In fact, its speed and reliability are enhanced. Now there's true 30-cps throughput, because incoming data is buffered. Reliability is improved because its microprocessor logic means fewer circuit boards and components. This application of the latest design technology not only adds up to enhanced reliability but reduces size and weight as well.

As for quietness, the 743 KSR is virtually silent, as its name implies. Its non-impact electronic printing eliminates the disturbing noise associated with conventional impact printers.

At $1395* quantity one, the 743 KSR is another TI price/performance value leader. . . whatever your application: console I/O for software development, keyboard terminal for inquiry response, data entry, interactive remote computing, or a message network terminal.

OEM prices go below $1000* in large quantities; and attractive lease rates also are available. All *Silent 700* terminals are backed by TI's comprehensive worldwide maintenance and support services.

For more information on the 743 KSR and other *Silent 700* terminals, contact the nearest TI office listed below or contact Texas Instruments Incorporated, Digital Systems Division, P.O. Box 1444, Houston, Texas 77001. Or, phone Terminal Marketing at (713) 494-5115, extension 2126.

TEXAS INSTRUMENTS
INCORPORATED

*U.S. Domestic Prices

TEXAS INSTRUMENTS.

See Texas Instruments products at Interface '77 and Computer Caravan.

Arlington, VA (703) 527 2800 · Atlanta, GA (404) 458 7791 · Boston, MA (617) 890 7400 · Charlotte, NC (704) 333-1519 · Chicago, IL (312) 671-0300 · Clark, NJ (201) 574 9800 · Cleveland, OH (216) 464 2990 · Costa Mesa, CA (714) 540 7311 · Dallas, TX (214) 238-5316 · Dayton, OH (513) 253-6126 · Denver, CO (303) 751-1780 · Detroit, MI (313) 353 0830 · El Segundo, CA (213) 973-2571 · Ft. Lauderdale, FL (305) 733 3300 · Hamden, CT (203) 281 0074 · Houston, TX (713) 494-5115 · Independence, MO (816) 836 2676 · Indianapolis, IN (317) 248 6555 · Memphis, TN (901) 396 2416 · Milwaukee, WI (414) 475-1690 · Minneapolis, MN (612) 635-5711 · Mobile, AL (205) 471 1435 · New York, NY (212) 682 1690 · Orlando, FL (305) 644-3535 · Philadelphia, PA (215) 628 3434 · Phoenix, AZ (602) 249 1313 · Pittsburgh, PA (412) 771-8550 · Rochester, NY (716) 461-1800 · San Antonio, TX (512) 828-9161 · San Francisco, CA (415) 392-0229 · Seattle, WA (206) 455-1711 · St. Louis, MO (314) 569-0801 · Sunnyvale, CA (408) 732 1840 · Amstelveen, Holland 020/473 391 · Bedford, England 0234 67466 · Brussels, Belgium 733 96 24 · Cheshire, England 061 442 8448 · Copenhagen, Denmark 61/91 74 00 · Essen, Germany 0201/20916 · Frankfurt, Germany 0611/39/90/61 · Freising, Germany 08161/801 · Helsinki, Finland 90 408 300 · Madrid, Spain 675 2162 · Milan, Italy 02 688 8051 · Montreal, Canada (514) 341-5224 · Munich, Germany 089/32 50 11 · Nice, France (93) 20.61.01 · Osaka, Japan 06-304-9300 · Oslo, Norway 02 68 94 67 · Ottawa, Canada (613) 233 1177 · Paris, France (1) 630 2343 · Rome, Italy 839 4792 · Slough, England 0753-33411 · Stockholm, Sweden 08/235480 · Sydney, Australia 831-2555 · Tokyo, Japan (03) 402 6161 · Toronto, Canada (416) 889-7373 · Vancouver, Canada (604) 689 8017

©Copyright 1977, Texas Instruments Incorporated

Mini Bits

Four-Phase Users Meeting To Plan Midwest Chapter

SKOKIE, Ill. — Users of Four-Phase Systems, Inc. machines will hold a daytime meeting here on April 14 as a first step in forming a Midwest Users Groop to be affiliated with the National Four-Phase Users Association.

The location of the meeting will depend on the area that shows the greatest interest, according to Mary Jo Stabrowski, data entry manager at G.D. Searle & Co.

Interested users should contact Stabrowski at the firm, Box 1045, Skokie, Ill. 60076.

High-Speed Line Printer Designed by DEC for PDP-11

MAYNARD, Mass. — Digital Equipment Corp. has a high-speed line printer for its PDP-11 systems.

Designed for data centers and business applications, the LP14 is available in two models: a 64-character version that outputs 900 line/min and a 96-character model with 660 line/min ootpot.

Features include a forms alignment guide, high-speed paper puller, adjustable paper shelf, static eliminator and ribbon deskew. The printer cabinet was engineered to minimize printer noise, DEC said.

The 64-character and 96-character versions are priced at $24,000 and $25,700 respectively. Deliveries of both in single units or as part of PDP-11 systems are scheduled for July from DEC in Maynard, Mass. 01754.

Tandberg Links Recorder, HP 21MX Minicomputer

SAN DIEGO — Tandberg Data, Inc. has linked its TDC 3000 digital cartridge recorder to the Hewlett-Packard Co. 21MX minicomputer, the firm said.

The interface uses two select codes and occupies one card slot in the 21MX. It connects to the recorder over a cable and data transfer takes place in either 8-bit or 16-bit parallel mode.

Packing and unpacking, if necessary, are handled by the interface, the company indicated.

The interface costs $1,500, a spokesman added from Suite 407, 4901 Morena Blvd., San Diego, Calif. 92117.

Correction

The price of the Custom Systems, Inc. Slot Saver multicontroller interface board for Data General Corp. minis [CW, March 7] is $1,250.

Upgrades Disk, Unbundles Software

HP Reconfigures 3000 Series II Models

By Esther Surden
Of the CW Staff

PALO ALTO, Calif. — Hewlett-Packard Co. has revised the configuration of the HP 3000 Series II system, upgrading the disk capacity and unbundling all software except basic operating software.

The company has also dropped the price of its add-on memory from $5,400 to $4,700 for a 64K-byte memory module, a spokesman noted.

The Series II now uses a 50M-byte disk drive developed by HP which is said to increase the systems' performance by up to 20%.

Formerly 3000 II systems were available in three models including varying amounts of software. "But we discovered our users didn't want or need all of the software bundled in," the spokesman stated.

Now users can get two 3000-II models, the Model 6 and Model 8. Both include the Multiprogramming Executive II operating system, HP's Systems Programming Language/3000 and a package of utilities for file copying, sorting, merging and text editing.

The net result of the revised configurations coupled with the disk storage is a system comparable to the three previously available systems at a slight decrease in cost, HP said.

For example, the former Model 7 with 192K bytes of memory, two 47M-byte disks, software for data base management, Cobol and RPG cost $150,000. A similar Model 6 configuration with 192K of memory and two 50M-byte disks, including the same software, costs $148,700.

The smaller Model 6 inclodes 128K bytes of memory, 50M bytes of disk, a 1,600 bit/in. tape drive, HP 2640B CRT console and a terminal controller. It can accommodate up to 256K bytes of memory and can handle up to 15 asynchronoos terminals at op to 2,400 bit/sec.

Present Model 5 and 7 users can upgrade to the Model 8 configuration with the installation of an upgrade kit costing $25,000. The kit allows memory expansion beyond 256K or expansion of the available number of I/O slots, HP said.

The larger Model 8 is the same as the Model 6 but includes an additional bay for more memory and greater peripheral expansion, the company said. The basic Model 8 has 320K bytes of memory and is expandahle to 512K byts.

Five Language Options

Users can optionally choose from five higher level programming languages for both systems — Cobol, RPG, Basic, Fortran IV and APL, according to HP.

Additional optional software inclodes the Keyed Sequential Access Method (Ksam/3000) and DBM/3000, which includes HP's Image/3000 data base management system and Query/3000 inquiry facility.

(Continued on Page 48)

Business Systems Can Be Built To Run Continuously: Tandem

By Esther Surden
Of the CW Staff

SAN FRANCISCO — "The need for entire businesses to go on-line is stimulating a requirement for inexpensive computer systems having continuous availability," James A. Katzman, vice-president of engineering for Tandem Computers, Inc. said in a paper presented at a conference here recently.

So the firm set out to design a multiprocessor system in which no single component failure could bring the system down.

The system also had to be able to be repaired without stopping and the operating system had to be designed to allow a program to continue to operate in spite of a hardware malfunction, Katzman said. The result was the Tandem 16 Nonstop system.

Traditionally, other systems had handled the requirement for continuous operation by using two processors with devices such as I/O channel switches and interprocessor communications adapters operating between the CPUs. While this eliminated the processor as a point of failure, it created new weakness areas and still did not solve the entire problem, he said.

Systems designed this way also shared memory, which could become another "single failure point," he pointed out.

Since communications between the CPUs is needed for checkpointing — letting a watcher program know where the running program is in its execution — losing the communications can cause the system to degenerate, he indicated.

A "double link" satisfies the problem of losing communications, but creates another: I/O bandwidth degradation, Katzman noted. "A drain of I/O capacity by checkpointing over the I/O bus restricts the number of terminals, disk files and transactions per second the system can manage."

Traditional systems also overlooked the problems of power supplies going down, cooling systems that are hard to maintain and replace and on-line maintenance.

Answer Not Perfect

Tandem's answer to the problem of the "nonstop" system is not perfect, but it does take care of most of the major difficulties in a price range businesses can afford, Katzman claimed. When asked what degree of availability his firm guaranteed, he flatly stated, "We don't guarantee anything."

But, he added, the company's own projections of its product's uptime have been very accurate in the 10 months since the system was first shipped.

(Continued on Page 48)

Memorex Adds OEM Disk Drive

SANTA CLARA, Calif. — Memorex Corp. has introduced a fixed media disk storage drive designed for small business systems.

The Memorex 601 is an OEM drive with capacities of 25M-, 50M- or 75M bytes. It can optionally provide 512K- or 1M bytes of fixed-head storage, the firm said.

The 601 has a data transfer rate of 885,000 byte/sec and an average access time of 32 msec, a spokesman added.

The drive uses a proximity recording technique, according to the spokesman. With this technique, low-mass and low-load heads operate in conjunction with disk surfaces on which a shield coating has been applied, he explained.

Because the heads contact the disk surface when not in rotation, the need for head loading and unloading mechanisms is eliminated, the company claimed.

A sealed drive module contains the drive's read/write heads, rotary actoator, spindle absolute filter and up to six data surfaces, depending on the particular storage capacity.

The 601 can operate in either a horizontal or vertical position and can be mounted in a standard 19-in. relay rack or housed in a 601 disk drive cabinet.

Memorex uses a rotary actoator which locates and maintains the track position. The actuator requires less power than a linear actuator, so generates less heat and has fewer moving parts, the spokesman said.

The data surfaces are coated and the surface shield increases output and resolution, Memorex said. The 100X coating sorface shield extends the life of the disk over 100 times that of unshielded disks, it claimed.

Memorex did not disclose the drive's price, but said shipments are scheduled to begin in April. The company is at San Tomas at Central Expressway, Santa Clara, Calif. 95052.

HEY, BERT! WHO'S GOT THE BEST PRICES AND FASTEST DELIVERY ON DEC & LSI TERMINALS?
OH BOY! WE HAVE, DUMMY. WE'RE MTI... OF COURSE, OF COURSE... AND WE HAVE EVERY TERMINAL ON SALE, LEASE OR RENTAL.

Just Look at These Terminals!

DEC writers LA36/LA35
DEC writer III LS120
DECprinters LA180
Lear Siegler ADM1
Lear Siegler ADM2
Lear Siegler ADM3
DEC Scopes VT50
DEC Scopes VT52
DIABLD Hyterm

and OMNITECH Modems MFE Cassette Data Terminals, and everything else you need for your Communications Network

For quick response Call TOLL FREE 800 645-8016

In New York Call 516 482 3500 or 212-895 7177 Ask for Bert or Lenny

When you buy from MTI you get a Price Advantage and a lifetime friend you can count on!

mti

[illegible] Northern Boulevard Great Neck New York 11021

Intel Unveils Memory System for PDP-11; Gives Up to 128K Words of Added Storage

SUNNYVALE, Calif. — Intel Memory Systems has introduced its In-4011 add-on memory system for Digital Equipment Corp. PDP-11 minicomputers.

The semiconductor memory system stores 32K to 128K 18-bit words in a 7- by 19½ by 17-in. unit and operates with cycle times of 650 nsec and access times of 500 nsec, according to the firm.

The interface is Unibus-compatible and includes parity error controls, the firm noted.

The basic card stores 32K of data plus parity bits in 4,096-bit random-access memory devices, a spokesman said.

Intel's base price is $4,560 for a 32K system. The system expands in 16K increments for as much as 50% less than the price of previous PDP-11 add-on memories, the vendor claimed.

For typical expansions of 64K and 128K words, total costs are $6,490 and $10,350, respectively, including parity generation and checking, integral parity, registers, interface, cabling and all other equipment required to install the unit.

Delivery is 45 to 60 days from Intel Memory Systems, 1302 N. Mathilda Ave., Sunnyvale, Calif. 94086.

Hospitals Can Achieve 'Spectacular Results' With Shared Systems

By George G. Derry Jr.
Special to Computerworld

Although a trend toward in-house minicomputers for hospitals seems to be developing, users considering such a route should look into the possible cost savings with either time-sharing or shared systems within hospitals.

Each year many articles are written regarding unique DP solutions for hospitals.

Most of these articles deal with "spectacular results" that have been achieved by using computer X or software Y.

Shared Systems

As a consultant working within a certified public accounting firm that services the health industry, I believe some spectacular results can be obtained using shared computer systems.

It has been our firm's experience that hospitals sharing computer time can realize spectacular results and operate at a comparable or smaller cost per patient-day than their counterparts with in-house minicomputer installations.

Recently our firm completed a survey for a hospital to determine if its DP costs were reasonable.

When our survey was completed the findings were summarized as follows:

- In-house computer users were experiencing costs that ranged from $3 per patient-day to $6.71 per patient-day.
- Shared computer users were spending from $2.97 to $3.50 per patient-day for the same systems (labor included).

These results would vary with hospital size, occupancy rate and other variables. However, the conclusions would probably be the same.

"A shared computer hospital's cost will usually be in line with the most efficiently run in-house computer systems."

Cost, however, is not the only consideration when running a DP operation in a hospital. Increased revenue, reduction in late charges and decreased days in accounts receivable are the spectacular results obtained from good hospital systems.

When these results are in, shared systems deliver as well as their in-house counterparts.

Recent Conversion

One example of this was a recent conversion of a patient accounting system in a hospital from an electromechanical bookkeeping system.

Approximately $900,000 in added annual revenue was realized. Late charges were reduced, and accounts receivable collections went up substantially.

In this case, the annual cost of the system was returned six times in additional revenue.

Derry is the department head in charge of management advisory services for Gordon & Berg, Certified Public Accountants in Los Angeles, Calif.

PDP-11 Gets Reader Link

HOUSTON — A plug-compatible card reader interface for the Digital Equipment Corp. PDP-11 has been released by Information Products Systems, Inc. (IPS) here.

The CDR-101 is compatible with DOS/Batch-11, RSX-11, RSTS-E and all other PDP-11 operating systems, IPS said.

The CDR-101 sells for $3,200 from IPS at 6565 Rookin, Houston, Texas 77074.

Go ahead. Save the money. Design your own system.

And sweat not the service.

There are a lot of very good hardware makers in this business.

Hardware makers who, in order to compete with that company with the three impressive, and expensive, initials, offer you more impressive, and less expensive cost/performance stories.

And one nagging worry.

The worry: if you pick a mainframe here, and an add-on memory there, and a West Coast printer, and an East Coast CRT, and an out-of-the-country plotter, who do you call when something goes wrong?

Please: don't worry.

Because when you talk with your various suppliers, you'll find that many of them have the same answer: you call SORBUS.

That's us.

We already service more pieces of hardware (60,000), in more user locations (16,000), from more cities (160) than any other company in our business. We service, for one instance, just about 80% of the add-on memory units attached to IBM systems.

And we work for people with some pretty impressive initials of their own (alphabetical selection on request).

And even if your hardware supplier doesn't use us directly, you can. For every piece of hardware in your system.

One phone call does it. Without any time wasted on finger-pointing. ("No, not my unit; must've been theirs".)

We take full responsibility, from writing the operations manuals to keeping the right spare parts handy.

So, go ahead. Get out from under the Armonk umbrella. Just make sure you take out some rainy-day insurance. Uptime insurance.

Call SORBUS.
215-265-6700.

SORBUS INC.®
anMAIcompany
150 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406
215-265-6700

From 8 to 1.6 Hours Daily

Small Business System Reduces Firm's Invoice Time

EMERYVILLE, Calif. — By switching from two accounting machines to a small business computer with a work station, H.S. Watson Co. has reduced its daily invoice input time from 8 to 1.6 hours.

H.S. Watson is a manufacturer and distributor of power transmissions and motor equipment for trucks, boats and pumping equipment. The firm services an international clientele through four branches and processes 400 invoices per day, as well as 40 to 100 checks.

The company began its thrust toward automation with an NCR accounting machine, then graduated to two Burroughs Corp. L5000 accounting machines.

"They were good machines, but were very limited when it came down to what we could do with them," according to Robert M. Herrara. "The machines were too slow to keep up with the volume of invoices.

"We had to keep a person on the Burroughs eight hours per day doing invoices only," he said.

"In addition," he continued, "equipment servicing and maintenance was not up to our needs. Our work is so critical and the workload is so high that if our system is down for only half a day, we're really stuck.

"Not only was the system too slow for us, but we could only obtain product code information on our reports quarterly, which wasn't frequent enough,"Herrara said.

An additional disadvantage with the old system was the absence of a check-writing capability because the Burroughs machine was tied up processing the 400-invoice load.

The firm considered Basic Four Corp. and Burroughs systems prior to going with a Wang Laboratories, Inc. small business system in October 1975. It chose the system because of its modularity, Herrera explained.

H.S. Watson purchased a Wang 16K WCS/30 small business computer, consisting of a CRT/typewriter console, with disk storage, high-speed printer and one workstation.

Now, with the WCS/30, "one person can input in one day what took four or five days before. A person could, if necessary, even process 1,600 invoices per day," Herrera said.

The system also allows the input of cash transactions and related reports for cash deposits. Deposit slips and a list of checks are now generated, enabling all checks to be deposited in the bank almost immediately.

Because of the enormity of the workload and because providing all vendor invoice payables and reports requires a large amount of print time, H.S. Watson decided to add a workstation to the WCS/30, Herrera said.

One person inputs information into the workstation essentially all day. In the morning, checks and associated information are input. During the remainder of the day, bank deposit slips are printed and worksheets and file information for accounts are handled.

At the same time, sales received, requried investments, payables and vendor invoice information are handled on the WCS/30 console, he stated.

"The two persons that operate the Wang computer," Herrera explained, "were trained in about one day."

"Because of the way our programs are written, along with the prompting CRT screen on the WCS/30 and workstation, if the need ever arises to replace either person, I'd look for a bookkeeper, not a computer operator."

All of the programs for the system were written in Basic by an in-house programmer. "We wanted a programmer within our own organization who could put our ideas and goals into proper perspective," Herrera explained. "We prefer this approach to purchasing standardized software.

"Although the end results of financial statements are similar in many companies, each business is unique in its detailed accounting process," he noted.

Some of the specialized accounting requirements handled by the system are financial management reports containing sales by customer, month, year-to-date, product code, dollar amount and gross product.

Accounts receivable, accounts payable, aging (120 days and older), inventory updates, general ledger, and management planning are also handled by the system.

PERIPHERAL
MANUFACTURERS

Are you getting your share of the Government market?

650 page government publication lists all federally owned or leased computers by manufacturer, model, quantity, agency, location.

Partial listing of manufacturers:
BURROUGHS DEC
CONTROL DATA IBM
DATA GENERAL UNIVAC
HONEYWELL VARIAN
HEWLETT PACKARD WANG

$22.50/copy to:
Pubserve
P.O. Box 34911
Washington, D.C. 20024

Mr. Data Processing Manager...

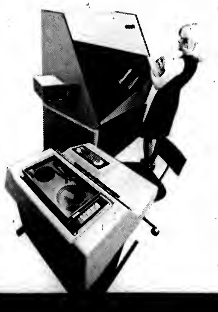
want to protect your keypunch kingdom?

Then don't let your boss see this ad!

It's a recognized fact that over 30% of costs in the average computer installation are for data entry. The unique Laser OCR-ONE optical character recognition system has been specifically designed to reduce those costs. In fact, it's cost justifiable for the replacement of only three key stations.

A Laser OCR-ONE user has reduced their keypunching staff by over 50% . . . with savings amounting to more than $10,000 a month!

We'd welcome the opportunity to give you a demonstration and provide detailed information on the remarkable advantages of the Laser OCR-ONE.



Contact me today for complete cost-saving information.

Billy Graham
Vice President/Marketing

Optical Business Machines, Inc.
804 West New Haven Avenue
Melbourne, FL 32901
(305) 727-1774

An affiliate of Florida Data Corporation

I'd like more information about the Laser OCR-ONE M

Please send descriptive literature ☐
Please have a salesman call me ☐

Name
Title
Company
Address
City
State
Zip Phone
F2

Systems Can Be Designed to Run Continuously

(Continued from Page 45)

The Tandem 16 Nonstop is a multiprocessor configuration of small-scale systems, each on a power level ranging between the Digital Equipment Corp. PDP-11/45 and PDP-11/70, Katzman said.

All controllers are dual-ported, power and cooling systems are redundant and interprocessor communication "is strongly connected with internal CPU link hardware logic."

The communications does not occur on the hardware channel, he noted.

Controllers are all connected to two channels to allow communications to an alternate CPU in case of a processor failure. Each controller is also redundantly powered by a current-sharing technique, and each has an individual power switch allowing it to be shut off without shutting off the power supplies, he said.

Power supplies are configured so that only the associated processor goes down, not the entire system. A fan in the cooling system can also fail and the system will still run.

The goal of on-line maintenance has also been achieved with the system, he claimed, with service reps usually isolating and replacing failed modules within an hour.

Program Problem

Another thorny problem attacked by the system was applications programming for these kinds of multiprocessor systems. "In the past, it was difficult for users to write applications programs for this," Katzman said, because all types of directions and handling had to be taken into account. Also, users couldn't expand without rewriting applications software, he claimed.

In the Tandem system, a copy of the operating system resides in each processor and only those I/O drivers required to support controllers attached to a given processor are resident.

All communications of a program to any device goes via a file access, which then passes the request to the message router. This achieves geographic independence of programs, he stated.

Weakest Point

The weakest hardware part of the Tandem system has proved to be the disk drives with other mechanical devices following, he replied to a question from the audience.

The Tandem 16 is not a "fail-safe" system, he emphasized, but rather one that tries to solve a problem from a different approach in a commercial environment.

"The people we deal with have tried to solve the problem using the state of the art as it existed before, and haven't been successful," he concluded.

HP Revises 3000 Series II

(Continued from Page 45)

DEL/3000, also available separately, provides the capability for interactive forms generation and collection and editing of data from a terminal during transaction processing, HP stated.

Both of the models support a synchronous communications interface for transmissions up to 9,600 bit/sec with software to emulate an IBM 2780/3780 remote job entry terminal, the company said.

Disk Drive

The HP 7920A 50M-byte disk drive has a maximum track-to-track seek time of 5 msec and an average access time of 25 msec. Up to eight of the drives can be attached to a Series II system, and the drive can be connected to the same controller used with the earlier 15M-byte drives, the firm said.

The drive can also be connected to other HP systems, it added.

The drive features higher reliability and better maintainability than the firm's previous 47M-byte drive, the spokesman claimed. This has allowed the company to reduce maintenance costs per drive by 59%, HP added.

Error Correction

The 7920A controller performs dynamic error correction, the firm said.

Additional disk memory for the Series II costs $14,000 for a single 50M-byte add-on drive and $26,000 for a pair. The basic Model 6 system costs $110,000 and the basic Model 8 costs $140,000.

Fortran, RPG, Basic and Cobol cost $4,500 each. APL costs $15,000.

DBM/3000, including Image and Query, costs $11,000 while Ksam/3000 is priced at $2,500 and DEL costs $1,500.

IAI Develops Turnkey For Use in Factories

WHITE PLAINS, N.Y. — Information Automation, Inc. (IAI) has introduced a factory data turnkey system which continuously monitors job performance, machines and operators, the firm said.

A terminal takes piece counts from machine sensors and transmits downtime and scrap data. The terminal also enables the operator to call for assistance and provides communication between foreman and crafts.

Summarizes Operations

Linked with a Digital Equipment Corp. PDP-11/04 and PDP-11/05 minicomputer, CRT display and printer, the system summarizes department and plant operations by the shift. Most plants average 100 to 150 operator stations at each plant. A terminal is located at each station.

Data is output for incentive pay, daywork analysis and inventory accounting.

Reports show reason and length of downtime and compare actual production with projections, the firm said.

The turnkey system costs $2,000 from IAI at 925 Westchester Ave., White Plains, N.Y. 10604.

Lomac Enhances Adam With IBM-Compatible Drive

SUNNYVALE, Calif. — Logical Machine Corp. (Lomac) has enhanced its Adam small business system with the addition of an optional IBM-compatible floppy disk drive.

The Disk/45 holds about 250,000 characters, equivalent to a box and a half of punched cards, the firm stated.

The drive costs "less than $3,000" and will be available in March from Lomac at 1294 Hammerwood Ave., Sunnyvale, Calif. 94086.

Would the Dinosaur have lived longer if it had been smarter?

The Dinosaur, in its time was the biggest and most powerful creature the world has ever known.

But, as you may have noticed, there aren't too many Dinosaurs around any more.

Mainly because they've been superceded by creatures that are smaller, faster and infinitely more efficient.

The same is becoming increasingly true of TP packages.

In the early days it was enough to have a TP package that worked. It didn't matter too much how big and clumsy it was. Today a TP package has to do rather more than that.

Shadow II is a brand leader in the very tough European market. And it's quite definitely post-Dinosaur era.

The result of six years continuous development it has very specific advantages over its "pre-historic" competition.

For starters it takes just twenty minutes to install. As opposed to the days or weeks it takes to get one of its predecessors operational.

It is a genuine rather than pseudo multi-tasking, multi-threading system.

It has the most sophisticated Transaction Processing facility ever developed.

It has a unique software paging operation that gives the non VS 360 a powerful virtual memory facility. But better than that, it also very significantly enhances the virtual memory performance of all 370s running on-line work.

There are very much lower storage and CPU requirements. And you know the phenomenal advantages that will give you.

Because it's so much easier to use its a great deal easier and quicker to train personnel to use it.

Shadow II uses a system called Shadow Telecommunication Access Method – STAM for short.

And STAM makes dear old BTAM quite obsolete. For starters STAM only uses about 10% of the storage required by IBM's BTAM.

The Shadow II support team also is somewhat unusual.

Unlike some of our predecessors who specialise in having huge, barely qualified squads of people roaming the country – Shadow II maintains a group of very highly qualified software specialists who can solve a problem in double quick time.

In brief Shadow II is the fastest most cost-efficient easiest to use TP package in the world.

It's also one of the most expensive.

It costs a fifth of a man more per year than CICS for example.

But then it does have the small added advantage that it can give the Shadow II user 100% greater efficiency from his machine and more importantly from his operating personnel.

Now we don't expect you to take our word for all this.

All we would ask you to do is fill in the coupon below so we can have the opportunity of proving Shadow II to you.

Altergo Software Inc, Wellesley Office Park,
20 William Street, Wellesley, Mass. 02181
Tel. No. (617) 2376132/2376332

Dear Altergo – those are some pretty expansive claims you've just made on behalf of Shadow II I hope you can prove them Tell me more

Name ____________
Responsibilities ____________
Organisation ____________
Address ____________
____________ Phone ____________
IBM computer ____________ Op system ____________
Present TP package ____________
my requirement is immediate ☐ within 6 months ☐
more than 6 months ☐

Shadow II
The World's most advanced TP Monitor
altergo

Detach here, moisten and seal envelope securely before mailing.

Fold and insert order form (attached through binding) and remittance here.

[illegible]
ORDER FORM AND
THIS ENVELOPE FOR:

a new subscription
new address
new title
new industry

Order form is attached through binding. Be sure to include current label or label information when making a change.

first class
permit no 40760
newton ma

BUSINESS REPLY MAIL *no postage stamp necessary if mailed in the United States*

postage will be paid by

COMPUTERWORLD

797 Washington Street
Newton MA 02160

CIRCULATION DEPARTMENT

Improve Accuracy

Mini Systems Track Firms' Lock Washer Inventory

With over 84,000 possible combinations for a product, a business needs some way to accurately keep track of inventory.

The small business systems at the Mellowes Co. in Milwaukee and at National Lock Washer in North Branch, N.J., are performing just such a function, according to J. Burton Bauman, general manager at National Lock Washer and participant in the Mellowes installation.

Both sister firms manufacture lock washers, available in more than 130 basic sizes. In each size, there are five industry-standard options of thickness and width and there are 13 materials from which to choose and 10 available finishes.

Packaging is yet another business control headache, Bauman said. Lock washers are available from the two firms in 50-pound cartons or in boxes containing 100, 500 or 1,000 units.

Most Logical Way

A small business system seemed the most logical way to go for the companies. Bauman looked at service bureaus and time-sharing and rejected these options because of cost, except for a specific application such as payroll.

But something was needed to upgrade from the old Singer billing machine, so the firms requested proposals from "15 or 20 sources and got back about five or six viable replies," Bauman said.

"We then visited them all, to make sure they understood our needs," he added. The field was narrowed down to Ultimacc from STC Systems, Inc. in Paramus, N.J. and a system from a Chicago company. The firms finally chose the Ultimacc system.

Together the firms carry active inventory listings of more than 1,500 items.

Major files in the systems are open order, customer master, product/inventory and raw materials. These files are linked to a range of supporting files, such as order items, "ship to" names and addresses, open accounts receivable items, customer part numbers and open purchase orders.

The systems treat quotations as a special type of open order, making it possible to transform a quotation of any size into an open order simply by changing the transaction type, Bauman explained.

In addition to its principal function, the order entry mechanism is also used to issue credits, for the interdepartmental transfer of materials and for the recording of special charges on the shipment of noninventory items.

Major Improvements

At National Lock Washer, Bauman reported that the advent of Ultimacc has resulted in an improvement in the speed, efficiency and accuracy of processing orders, issuing invoices and controlling inventory.

When National was using an invoicing machine, there were many time-consuming manual tasks to be performed, he said.

These included order editing (translating customers' part numbers and descriptions into National's own product nomenclature), order entry, followed by bursting and filing the 17-part forms, posting inventory changes and compiling shipping requirements.

Another major benefit has been accuracy. In the year before Ultimacc was installed, credits had doubled from the previous year, principally because of paperwork errors. Today, credits have virtually disappeared, Bauman said.

Bauman said he continues to look for new worlds to conquer with his Ultimacc. Currently, he is planning to move payroll processing (which is being done by a service bureau) onto his Ultimacc this year, he added.

"We have the time and the trained personnel, so we are confident we can handle payroll in house," he said.

Mellowes is expected to take the same step this year.

BC/7 Seen Beginning Univac Product Line

CHERRY HILL, N.J. — The Univac BC/7 is expected to be only the "first model of a new product line which will probably include a BC/8 and a BC/9, and even larger models," according to an article in this month's issue of *Small Business Computer News*.

"The Univac BC/7 does have strengths over the (IBM) System 32," the article stated. These strengths include multiple terminal capability, concurrent data entry with application program execution, the Escort business user language and removable disks with a larger storage capacity.

The system also has an RPG-II program language similar to that of the System 32, is in its price range and can use the IBM 3740 data entry system for off-line data entry via diskettes, the analysis continued.

The BC/7's weakest points are its inability to perform multiple application programs, limited number of workstations, present product size, limited data communications capability, single product offering and entirely new sales force, the article stated.

Small Business Computer News is available from Management Information Corp. at 140 Barclay Center, Cherry Hill, N.J. 08034.

Wang Minis Get Time-of-Day Clock

OAKLAND, Calif. — Fluidyne Instrumentation has introduced a time-of-day clock for the Wang Laboratories, Inc. 2200 series minicomputer.

Called the 7230A, the unit is panel-mounted and displays seconds, minutes and hours, the firm said.

The clock can be set at any time from front-panel pushbutton controls, according to a spokesman. Two buttons must be pressed simultaneously to prevent accidental alteration of the clock's value.

The clock is useful for applications such as production monitoring or on-line data acquisition, he noted. It interfaces to the Wang system via a 2252 or 2252A I/O controller card provided by Wang.

The 7230A costs $750 from the firm at 1631 San Pablo Ave., Oakland, Calif. 94612.

Don't use an L.A.-to-Chicago modem between LAX and Century City.

High speed modems are overkill in short haul networks.

If you're transmitting data long distances, Los Angeles to Chicago for instance, you need expensive high speed modems.

But if you're going only cross town or across the street, there are other devices that can do the job far more efficiently, and for far less money.

Our line drivers are designed for short haul networks.

Our Synchronous Line Drivers (SLDs) have switch selectable data rates from 1200 to 19,200 bps. Our Asynchronous Line Drivers (ALDs) handle baud rates from 0-9600 bps. They can both replace any modem operating within those speed ranges. They both conform to Bell specification #43401. They operate on either loaded or unloaded cable.

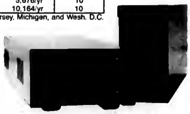
Our rental costs are lower than Bell's, or you can increase your savings even more by buying from us outright.

We have a size advantage, too. Eighty-eight of our units fit into a single cabinet. Bell fits no more than 70, and sometimes as few as 10 into the same size cabinet.

Replacing Bell Modems with Prentice Line Drivers can save you from $2,740 to $49,220 per line over a 5-year period.

Bell Modem	Prentice Replacement	Approximate cost savings per year* on 1 line, Bell rental vs. Prentice purchase		Typical limit in miles using a Prentice unit
		1st Year Savings	Succeeding Years Savings	
103F	ALD	$ 148	$ 648/yr	40
202	ALD	270	770/yr	40
201C	SLD	462	1,512/yr	25
206A	SLD	1,706	2,796/yr	16
209A	SLD	4,316	5,676/yr	10
301 (19.2)**	SLD	6,564	10,164/yr	10

*An average of the savings in Boston, New Jersey, Michigan, and Wash. D.C.
**Special assembly only.



More diagnostics mean less downtime.

Our SLDs have 9 diagnostic LED indicators. Loopbacks include local analog, local digital and remote digital. A built-in self-test feature makes our SLDs ideal for unattended testing. They can talk to either themselves or any standard 511-bit pseudo-random pattern test set.

Our ALDs have 8 diagnostic LED indicators. Loopbacks include local analog and local digital.

Simple installation and operation.

Our line drivers need no adjustments, no meters, scopes, bit error rate testers or Bell servicemen for installation.

Our SLDs use state-of-the-art CMOS technology for better reliability. An extremely stable crystal oscillator, used for both signal generation and system timing, assures long term stability.

Let us tell you how much you can save.

We'll help you compute how much you can save by replacing your high speed modems with Prentice line drivers. Call or write for details.

Visit our booth at Interface'77.

PRENTICE
Prentice Corporation
795 San Antonio Road
Palo Alto, California 94303
415/494-7225

HIGH COSTS KEEPING YOU OUT OF TELEPROCESSING?

HERE'S THE ANSWER:

GREYHOUND PHOENIX ICA

Here's a *proven* performer that turns a 360/30 into an economical RJE terminal with stand-alone capability or a host computer for multiple terminals.

It's the Greyhound Phoenix Integrated Communication Adapter (ICA). It gives any 360/30 user a communications controller equivalent to an IBM 2701 with Synchronous Data Adapter Type II, EBCDIC Code and Transparency.

AT LESS THAN HALF THE COST!

The Greyhound Phoenix ICA is available immediately. You don't even have to give it floor space—it sits on top of the cpu. At least 85% of DP shops engaged in teleprocessing (or considering it) can make profitable use of the Greyhound Phoenix ICA. Let us give you facts and figures. Contact: Tom Ryan, Eastern General Mgr., (617) 272-8110; Jerry Rogers, Central General Mgr., (412) 922-8920; or Dave Hyland, Western General Mgr., (415) 283-8980.

SEE US AT INTERFACE 77
BOOTH 336 MARCH 28-30

GREYHOUND COMPUTER CORPORATION
14th Floor, Greyhound Tower, Phoenix, AZ 85077

DEC
310-320-350
New Enhanced Versions
BUSINESS SOFTWARE

- ORDER ENTRY (INVOICING) / INVENTORY CONTROL
- ACCOUNTS RECEIVABLE WITH SALES ANALYSIS
- ACCOUNTS PAYABLE
- GENERAL LEDGER
- PAYROLL

These packages are Turnkey Systems, completely documented, and easily modified for specific End Users.

For Distributors there's a one-time low cost licensing agreement with no further royalties.

DISTRIBUTOR AND END USER INQUIRIES INVITED

CALL TODAY (213-658-8122) OR USE THE COUPON BELOW

MCBA MINI-COMPUTER BUSINESS APPLICATIONS, INC.
6420 WILSHIRE BLVD., SUITE 950
LOS ANGELES, CA 90048

PLEASE SEND ME MORE INFORMATION:

Name ____________________
Company ____________________
Address ____________________
City ____________________ State ____________________
Zip ____________________ Phone ____________________

* DEC is a registered trademark of Digital Equipment Corp.

GRI Adds System 99 Printers

NEWTON, Mass. — GRI Computer Corp. has added two line printers to the printer options available for its System 99 small business system.

The Model 9325 is a 250 line/min printer with a 64-character Ascii font; the Model 9326 operates at 180 line/min with a 96-character font.

Both use a 132-column print format, the firm said.

The printers feature changeable print-belt characters. Adaptive control logic allows the printers to monitor each print line and adjust for maximum speeds based on character content, the company added.

The units also feature a paper status detection alarm to notify the operator to load forms or check for paper jams. They use standard pin-fed continuous forms and industry-standard IBM 1403-type ribbons, GRI said.

The Model 9325 costs $9,575 and the Model 9326 costs $9,800. GRI is at 870 Georges Road, North Brunswick, N.J. 08902.

TI 990 Family Users Offered Software Development Systems

HOUSTON — Texas Instruments, Inc. has introduced two floppy disk-based software development systems for users of the 990 mini/microcomputer family.

The systems, designated FS990/4 and FS990/10, support development, testing and maintenance of applications programs, the company said.

Software and Firmware

Both include the capability for software and firmware development for the TMS 9900 microproeessor unit, the 990/4 microcomputer and the 990/10- minicomputer, TI said, adding the differences between the two systems are the processors and 8K of memory.

The FS 990/10 includes the 990/10 mini with 32K 16-bit words of memory with parity, dual floppy disks with 48K bytes of storage and a Model 913 CRT terminal, according to the company.

Printer options include TI's 700 Series models 743 keyboard send/receive and 733 automatic send/receive data terminals and the TI models 306 and 588 multicopy printers.

System software includes the TX990 executive operating system and TXDS development utilities. TXDS utilities include a two-pass assembler, interactive source text editor, two-pass link editor, stand-alone debug monitor and assorted general utilities, the company said.

Modular Executive

The TX990 executive reportedly provides operating system support for TXDS development utilities and offers the 990 user a modular multitasking real-time executive with floppy disk file management utilities.

Also included with the TX990 executive are linkable modular components to support custom system generation for any target 990 computer system, TI added.

Included with either system is the TX990/TXDS license, a one-year software revision subscription service, a user's guide and programming manuals, the company stated.

System Options

Additional systems options include the programmable read-only memory programming unit and the Model 804 card reader, TI said.

The FS990/4 incorporates all the features of the 990/10 but has the 990/4 micro with 16K words of memory.

Prices for the FS990/4 system begin at $10,500, while the price of an FS990/10 starts at $13,500. They will be available in April from TI's Digital Systems Division, located at M/S 784, P.O. Box 1444, Houston, Texas 77001.

IDT Video Generator Designed for PDP-11 Features Eight Colors

COLUMBUS, Ohio — A graphics video generator designed specifically for use with Digital Equipment Corp. PDP-11 minicomputers is available from Industrial Data Terminals Corp. (IDT).

The IDT-11 is configured as two quad-sized boards which plug directly into a DD-11 backplane and operate at main memory speed, the firm said. The generator features standard Ascii alphanumerics, paint-up and paint-down bar graphics, reverse video, blink and microprogrammable symbol graphics.

IDT-11

Foreground/Background

Individual foreground/background selection in any one of eight colors is made on a character-by-character basis, the company noted.

The system comes with software to aid in applications development as well as program listings, sample displays and a user manual.

The IDT-11 costs $3,100 with quantity discounts available, IDT said from Suite 176E, 1550 W. Henderson Road, Columbus, Ohio 43220.

Chassis Lets PDP-11 Use WP Controllers

ANAHEIM, Calif. — Western Peripherals, Inc. (WP) is offering the WP-919 external adapter chassis to Digital Equipment Corp. PDP-11 users for use with its TC-130 magnetic tape controllers and DC-230 disk drive controllers.

The chassis was primarily designed for users who prefer to mount controllers for tape and disk drives outside the computer, a spokesman explained.

Optional Cabinet

The optional external cabinet accommodates WP or DEC hex and quad peripheral controllers. The WP-919 will accept two TC-130 tape controllers or one WP tape controller and one DC-230 disk controller, according to the firm.

The unit is 5-1/4-in. high and 16 in. deep, with standard rack-mounting width. It has a standard 5V and 15V DEC-compatible power and holds up to nine hex boards, the firm said.

Fan-forced air cooling is provided for both the power supply and printed circuit boards.

The chassis costs $650 from WP at 1100 Claudina Place, Anaheim, Calif. 92805.

COMPUTER INDUSTRY

Microdata, Dealers, OEMs Disagree

Nonappearance of Express System Causes Dissension

By Toni Wiseman
Of the CW Staff

The relationship between a manufacturer and an OEM is a strange one at best, fraught with hazards on both sides. In some cases, these hazards grow from mere inconveniences to severe financial losses.

What is the manufacturer's obligation to deliver a system as it is first conceived?

Should an OEM invest time and money in developing a market and software for a product before it is a tangible entity?

Who is liable if the system never appears or appears in a more limited version, thereby destroying the market "built" specifically around its capabilities?

These are some of the questions, as yet unanswered, in the controversy surrounding Microdata Corp. and its Express system — or, one might better say, its "proposed" Express system since it has yet to appear "in the iron." The source of the problem is somewhat obscured as there is no consensus on many of the facts. However, one opinion is unanimous — Microdata made a serious miscalculation on development times.

All parties agree that Express, when it finally appears, will not include all the hardware capabilities initially promised by Microdata.

Microdata, however, indicated Express will eventually include all capabilities but, because of schedule slippage and in order to prevent end user problems, the system will at first be limited.

The Microdata Dealers' Association felt the manufacturer did not realize all the implications of dealer/OEM and Reality/Express situations with regard to price, performance and markets.

Some OEMs indicated they are now faced with applications software, based on preliminary OS coding, and a market for which there is no system.

At last year's National Computer Conference (NCC), Microdata announced Express, which was effectively a logical upward growth of what the firm had already been marketing for several years.

The system would have the same stack-oriented architecture as Microdata's 32/S, the same 3200 CPU and would take Microdata's block-structured generator language — MPL — and upgrade it to a new language known as EPL, Microdata claimed.

EPL was said to be a relatively close, useful, structured subset of PL/1.

Express would also have a new operating system — Express Multiuser Operating System (Emos) — which was to be a segmented virtual operating system with very high-level file capabilities.

The system was also to have a new disk drive and a tape drive associated with it; the disk to be based on Winchester technology.

Express was to be an OEM system, sold directly to that market.

Industry-Shaking Prices

By going the microcoding route in a stack architecture machine, and packaging it with an extremely high-density disk and tape technology, Microdata released prices in industry publications that were industry-shaking — quantity one prices below $20,000 for a 32K-word system.

The announcement essentially represented the bringing of the state of the art, of both hardware and software, in its commercial expression from large mainframes to the mini area, and at a price that "beat the pants off 11/34s and anything else around that is any good," according to an OEM.

Analysis

Today, however, nine months after the first announcement and three months after scheduled availability, Express is still nowhere to be seen.

Microdata is officially saying the system will be available in August or September, but with greatly reduced hardware capabilities.

In fact, in one OEM's estimation — one the president of the Microdata Dealer's Association could not disagree with — Express will be about half the system for twice

(Continued on Page 57)

Brokerage Firm Predicts

IBM to Enhance Mid-Life 370s to Foil PCM Growth

By Toni Wiseman
Of the CW Staff

NEW YORK — IBM will attempt to stunt the growth of plug-compatible manufacturers (PCM) by enhancing mid-life System 370 equipment and unbundling some of the software or resorting to a microcode strategy, according to a report by L.F. Rothschild (LFR), a brokerage firm here.

LFR further expects IBM to attempt a final solution to the PCM challenge by introducing a new computer line at the end of the decade, along with a new set of hardware/software economics.

"We speculate that the economies realized on the new equipment may offer a much greater incentive to purchase IBM's CPU equipment than is currently the case," the report noted.

"Limiting earnings exposure through less reliance on a rental base will allow the company to offer more rapid price/performance technology advances, which would encourage competitive displacement of IBM's machines," it added.

Higher Profit Percentage

LFR predicted that, eventually, a higher percentage of profitability will be built into IBM's service, education and software operations, where competition is currently very limited, enabling IBM to position its equipment pricing for an optimum competitive impact.

"In essence, this form of computer economics already exists in today's minicomputer industry. Hence, we might expect that the business strategies employed in the mainframe sector of the industry will evolve to more closely resemble those currently being practiced in the minicomputer field," LFR indicated.

The report suggested several countermoves IBM could make against PCMs, including a microcode strategy and unbundling the system control program.

IBM could take some or all of the instructions now included in the Systems Control

(Continued on Page 52)

Burroughs Executives Sued

NEW YORK — A $500 million suit has been filed here charging the chairman, president and senior vice-president of Burroughs Corp. with hiding inside information from stockholders until such time as the executives could dispose of substantial amounts of stock.

The defendants are Ray MacDonald, chairman; Paul S. Mirabito, president; and Donald Young, senior vice-president. Other officers are expected to be named in the suit at a future date.

"The shares of stock referred to in the suit were shares obtained by the officers of Burroughs through the exercise of stock options granted to them as part of their compensation and sold by them during 1976 for personal and income tax reasons," according to a Burroughs spokesman.

"These officers believe that there is no basis for any of the allegations and if, and when, any such suit is commenced against them they intend to resist it," he said, adding the Burroughs executives had not been served with any papers at that time.

The suit charged that, as a result of alleged misleading statements issued concerning the company's prospects, and as a result of the officers' sale of stock, shareholders had lost about $500 million.

In addition, the suit alleged the defendants, being aware of the company's true prospects, kept that information confidential during November and December, during which time they disposed of 54,400 shares of stock and realized a $1 million profit.

The suit charges that if the unfavorable information had been divulged, the price of Burroughs' stock would have dipped significantly, an event which did in fact occur when the news was revealed.

Burroughs' stock fell from $86 to $92 in December to $68.25 in January.

The suit, brought by a stockholder, asks that the defendants be directed to return the $1 million to the company and, in addition, be held liable for any suits which may be brought against Burroughs, in amounts up to $500 million, by stockholders who purchased stock because of false impressions caused by misleading statements.

t's only
logical that you
should expect to get the best
deal on a used
S/370 from the leader.

[illegible] marketing of IBM systems. We [illegible] best deal when buying [illegible] selling or leasing IBM computer [illegible] decision. Call Comdisco, the [illegible]

Re-THINK

COMDISCO
THE LOGICAL CHOICE
9701 W. Higgins Rd., Rosemont, Ill. 60018 (312)698-3000

[illegible] • Minneapolis (612) 854-8107 • New Jersey (201) 568 9666 • San Francisco (415) 944 1111

COATED PRODUCTS DIVISION
GRAPHIC CONTROLS CORPORATION
159 VAN RENSSELAER STREET, P.O. BOX 1271, BUFFALO, NEW YORK 14240

Just one of the many leading companies you'll see at
COMPUTER EXPO 77

Graphic Controls manufactures sensitized coded papers in both roll and fanfold form. These coded papers are used for data communications, facsimile transmissions, electrostatic plotting and computer time-sharing systems. Our paper is manufactured to fit most instrumentation in use today.

Organized by:
COMPUTER CARAVAN 77

The national computer exposition that's coming to you.
797 Washington Street, Newton, MA 02160
(617) 965-5800.

San Francisco • Los Angeles • Cleveland • Minneapolis/St. Paul
Chicago • New York • Philadelphia • Washington, D.C. • Boston. Starts March 29th.

IBM Seen Foiling PCM Growth With Enhancements for 370s

(Continued from Page 51)

Program and put them in microcode, which could not be easily handled by a PCM machine, the report indicated.

Amdahl Corp., for instance, would have to develop its own internal microcode instructions for the 470V/6 if IBM made this change in the operating system, it noted.

"Since hardware technology is advancing so rapidly, we do not think that IBM's adoption of a microcode-only approach would represent a practical long-range solution to competitive pressure," LFR stated.

The report added there is evidence IBM development of a microcoded control program that would be extremely difficult to copy is underway.

"It should also be noted that it would be costlier to maintain the System Control Program in microcode form than to use regular software, as there are constant changes taking place," it said.

An alternative move for IBM would be to unbundle selectable units of newer versions of the operating system, the firm noted.

"The general theory behind unbundling the System Control Program is that IBM would transfer a portion of its revenues and profits to this software area, making either better price/performance equipment or lower prices available, thereby cutting the margins of the [PCMs] and restricting the business opportunities," the report stated.

"Obviously, IBM cannot devote all of its profits to its software, leaving a minimal equipment profit for itself and others in the field, because, as a dominant force in the marketplace, it would be accused of predatory pricing.

"Also, this practice would establish a software price umbrella, fostering new competition," LFR said.

The Wall Street firm concluded that unbundling would not be effective in the long run.

LFR expressed the belief that there are only two practical long-term IBM responses to the PCM onslaught.

"It is quite possible that IBM will try to separate the selectable units in the system control category into microcode and software, making it more difficult for competitors to copy the CPU's internals, in tandem with instituting a separate charge for software.

"This would lower the margins available to plug-compatible competitors, which would be forced to drop prices to compensate the user for the extra cost of IBM software while facing increased expenses arising from constant IBM hardware microcode changes," the report suggested.

Alternately, IBM could institute a restrictive pricing policy on software not being used in conjunction with an IBM CPU. This, however, would raise the question of tie-in sales as well as legal issues, the report said.

FTC Formalizes Ban On Shared Directors

WASHINGTON, D.C. — The Federal Trade Commission (FTC) has formally accepted its previously approved consent order preventing IBM from having interlocking directors with competitors.

The regulatory agency fashioned the order last Nov. 10 in response to its complaint that two IBM directors also served on the board of New York Telephone.

The order, which prohibits any individual from serving simultaneously on the board of IBM and New York Telephone, AT&T or any other AT&T subsidiary as long as the two corporations compete in any area, was adopted by a unanimous vote of the commissioners following a period for public comment.

As with all such orders, this agreement between the FTC and IBM now carries the force of law and if violated demands up to $10,000 in civil penalties per incident. For settlement purposes only, the order does not constitute an admission of guilt on IBM's part.

Utility Packages

A special report in the April 25th *Computerworld*.

Whether you're sorting, spooling, writing, reporting, managing, maintaining, securing, capturing, manipulating or preparing data — you've probably used (or thought about using) one of the multitude of utility packages currently available.

Computerworld's April 25th special report, edited by Don Leavitt, will take a close look at the selection and use of these packages — with tutorials, user experiences and commentary on topics like these:

Computer operations and scheduling support systems — help operators make efficient use of hardware and software resources
Replacements, enhancements and extensions for utilities supplied by hardware vendors — operator invoked systems such as sorts, merges, file transfer and initialization
Data capture systems and support tools — for the capture, preparation and temporary storage of data
Data management systems and support tools — for the organization, storage, security, management and maintenance of permanent data files
Data retrieval, computation and presentation systems — for the retrieval, manipulation and output of data

If you're involved with programming efficiency — as a DP manager, programmer or analyst — you'll find useful information in this report. And if you're a software vendor or consultant you should advertise your products and services here. Ad closing date is April 8. Contact your *Computerworld* salesman for complete details. Or call Judy Milford at (617) 965-5800 to reserve space for your ad.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Boston	New York	San Francisco	Los Angeles
Bob Ziegel	Don Fagan	Bill Healey	Bill Healey
Mike Burman	Frank Gallo	Jim Richardson	Jim Richardson
(617) 965-5800	(201) 461-2575	(415) 495-0990	(213) 475-8486

CASH
FOR
SERVICE BUREAUS

- Profitable or Not
- Any Size Any Where
- Strict Confidence

Write Acquisitions, Box 201
Ocean City N J 08226

Telenet Sees 250 Packet-Switched Users by Year-End

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Telenet hopes to have 250 users on its packet-switched communications network by this end of the year, according to its vice-president for planning.

The company already has 115 "subscribers" or "host computers" linked to its system and expects to continue to grow at a rate of 12 new users each month, Stuart Mathison told the Fourth Annual Caucus of the Computer & Communications Industry Association (CCIA) here recently.

This growth is also reflected in Telenet's plans to announce rates soon for permanent virtual connection — the packet-switched equivalent of leased or private lines — and to go from 76 access nodes in the U.S. to 85 in the next few months, Mathison said.

In addition, the company will also respond to technological advances by converting those nodes over the next 18 months from multiplexers to microprocessor-based concentrators, he stated.

Foreign Service Slated

Before too much longer, Telenet hopes to offer foreign services to its users as well. Mathison told the CCIA's member organizations that within the last two weeks the firm filed a tariff application to provide service to Mexico.

Prior to coming to the association meeting, Mathison met with people from Canada's packet-switched telecommunications system, Datapac, to discuss its interconnection with Telenet.

The company vice-president predicted the industry will see an extremely rapid development of packet switching for overseas communications in the next year — primarily because it makes such efficient use of channel communications. The Federal Communications Commission recently approved Telenet's applications to get into this business, Mathison added, noting the firm will do so in conjunction with RCA Global Communications.

Telenet's seven major switching centers with 56 kbit/sec Bell System Dataphone Digital Service lines now serve 53 commercial computer service firms, 47 corporations, 12 colleges and universities and three government agencies, Mathison said. Atlanta will soon be upgraded to a major switching center, bringing that total to eight.

The firm anticipates continued user growth, in part, because of the price advantage it offers — chiefly over AT&T. The permanent virtual connection it expects to make available shortly "will cost a few hundred dollars instead of the few thousand that leased lines cost each month," Mathison stated.

The economics of a packet-switched telecommunications system are "extremely attractive" to companies with interactive or transaction data that is of a "bursty" nature, he explained. If a user's requirements demand that he send data continuously, he is better off with a leased line, Mathison added.

Whether a user chooses to use Telenet's multiple or single connection ports, his only costs when not sending data are the expense of the port and the access line at each end, he said.

Hosts Run the Gamut

Most Telenet users tend to be concentrated near Telenet sales offices, Mathison noted. The host computers linked to the network run from Amdahl Corp. 470V/6s to all types of minicomputers, he said, adding there are many IBM 370/155s and Digital Equipment Corp. Decsystem-10s and PDP-11/45s now using Telenet for "virtual calls" — the packet-switched version of circuit-switched communications.

Telenet provides its computer service users with the additional service of a list of those bureaus on the network. Corporations using Telenet for private communications are not publicized in this way, Mathison said.

Some of the firm's users, like American Can and Raytheon, sell their excess computer capacity through the packet-switched network, he stated.

The small service bureau uses Telenet because the network has the effect of providing it with regional service bureaus; the larger bureau is able to market its services over a wider geographic area, the vice-president said.

For all users, the rationale for using the network ranges from the facts that charges are based on usage and that the system can handle unpredictable traffic loads to the need to employ a wide variety of terminal types and to access multiple computer locations, Mathison added.

In discussing his firm's plans to extend its service abroad and its packet-switched counterparts in and outside the U.S., Mathison expressed Telenet's support for the standard packet-mode interface known as X.25 which was developed by the Consultative Committee on International Telephone and Telegraph (CCITT), the international telecommunications standards-making body.

Intended to be a device-independent interface to a public packet-switched network, X.25 will be used as the basis for the interconnection between Telenet and Canada's Datapac, Mathison said.

Telenet already has an interface which it claims is the functional equivalent of X.25, thus affording the user a means of connecting programmable devices to one another — be they full-fledged host computers or intelligent terminals or concentrators.

Between 25 and 30 of Telenet's current 115 subscribers employ this interface, which is a synchronous protocol for providing multiple connection on a single synchronous access line, he explained.

Using this interface, the network works "like one giant remote concentrator; the host computer is effectively connected to these points through logical or virtual channels," Mathison explained.

The interface permits a wide variety of programmable devices to connect to the packet-switched network efficiently, he added. It provides a single high-speed path anywhere from 9,600 bit/sec to 56 kbit/sec, a dynamic allocation of the network to all users and better response times measured in milliseconds as opposed to seconds, Mathison stated.

Telenet's other 70 to 75 users went with a less efficient interface that would accommodate the communications software and equipment they had when the telecommunications firm started operations a year and a half ago.

Emphasizing that X.25 is now an international standard, Mathison predicted that from the user and long-term viewpoints this standard interface could become "the RS-232 of 1980."

Check It Out For Yourself

	TLMS Release 4	Other
On-line updating and inquiry	Yes	___
Alternate logging capability	Yes	___
Protection of scratch and non-scratch status	Yes	___
Audit and inventory reports	Yes	___
Console sharing for multiple CPU's	Yes	___
Automatic scratching of tapes	Yes	___
Simple interface to OS	Yes	___
Scheduling and control of tapes being moved to off-site location	Yes	___
Automatic uncataloging of scratch tapes	Yes	___
Non-quiesing of tape jobs while backing up the master	Yes	___
Unchanged JCL for users	Yes	___
Non-degradation of system performance	Yes	___

PLUS — On-site training and installation — at no extra charge

What You Want From A Tape Library System — You Get From TLMS Release 4.

When you want an easier way to do a tougher job.

For more information, write or call:
Gulf Computer Sciences, Inc.
1775 St. James Place
Suite 160
Houston, Texas 77056
Tele (713) 627-9320

Member SIA Software Industry Association

An English-like Inquiry Language for IMS or IMS/VS.

Designed to maximize user responsiveness and IMS performance.

The only interactive system which offers...

- Full Support of MULTIPLE, PHYSICAL, LOGICAL, Data Bases
- TSO INTERFACE Against DL/I data Bases
- SORTING ON and/or OFF – LINE
- FULL ARITHMETIC capability
- Mix and Match ON–LINE and BATCH Operation
- DATA DICTIONARY Interfaces
- SUPPORT of ALL TERMINAL TYPES
- PRE–STORED Inquiries and Arithmetics
- REPORT WRITER Interfaces
- Mix and Match INPUT/OUTPUT Operations
- INQUIRY PAGE and TIME LIMIT Options
- TERMINAL LEVEL Data Field Security

If you want quality, complete capability, and maximum performance you should investigate IN?UIRY/ims (be sure to speak with our users).

cga COMPUTER ASSOCIATES INCORPORATED

Please Send me:

☐ BROCHURE

☐ TECHNICAL MANUAL

Name ______________________

Title ______________________

Company ______________________

Address ______________________

City/State/Zip ______________________

Telephone ______________________

CGA COMPUTER ASSOCIATES, INC., 1901 North Ft.
Myer Drive, Suite 1015, Rosslyn, VA 22209
(703) 522-1666

Sees '77 Best Year Yet

Incoterm Targets Vertical Applications

By John P. Hebert
Of the CW Staff

WELLESLEY HILLS, Mass. — Because Incoterm Corp. here offers a vertically integrated series of products, it is situated squarely in the path of the untapped 90% of applications for intelligent terminals, according to M.R. Clement, vice-president of corporate business and product planning.

Incoterm started out as a privately held company in 1969 and, by concentrating on the evolution of its standard product, it has offered users a better product, Clement and Sam Adams, vice-president of marketing, said.

The company's success in never experiencing an unprofitable year results from taking a basic device, modifying it to make new product lines and customizing it for each individual user, Clement said.

Incoterm expects the 1977 fiscal year to be the most profitable yet, with nine-month revenues of $27 million exceeding the 1976 level by more than $3 million, according to Adams.

Variations on Theme

The company's first intelligent terminal series, a stand-alone programmable device with 2K of memory, was aimed at the expanding airlines passenger reservation application area in 1969, 1970 and 1971, Adams said.

From there the company came out with a more powerful variation on its basic theme with a 4K-processor CRT, Adams said, adding it was about this time the company decided "to take all its eggs out of one basket" and searched for new applications areas.

The product evolution led to the second half of Incoterm's product line of intelligent devices which incorporated a clustered approach to DP because of the demands for increased user inquiry to large central data files from remote points.

The approach is reflected in the minicomputer-based SPD-20/20 CRT controller, which allowed reduced size in the clustered terminals with which the device communicated.

The move to other applications areas helped Incoterm make it through the 1974 recession and oil embargo which affected airlines, Adams noted.

In 1973, the company moved its headquarters to its site here and went public.

By 1974, Incoterm had already spread out over a host of other industries and only 36% to 37% of its products were used to access large airline data bases, Adams said.

The company then evolved another version of the standard product, a factory data collection device, the Incomate, which shared the SPD-20/20 product approach and strategy, he said.

Today, about 14% of Incoterm's efforts are devoted to the airline environment, while 22% is aimed at the banking area and the remaining 63% is spread out over other industries, he added.

Focus on Banking

This "major penetration" into the banking business, Adams said, has occurred in the last two years when Incoterm again expanded its basic terminals to include the Series 7000 on-line banking system.

The system allows teller access to bank customer information files contained in a bank's CPU from CRTs and peripherals to the intelligent devices.

The banking system was expanded last year to include in-lobby automated teller terminals as well as a wall-mounted version for customer banking after office hours, Adams noted.

Another secret of Incoterm's success is fully supported software for the product line, which includes over 400 user programs, allowing the devices to communicate with other vendors' computer systems he said.

Incoterm now has a $1 million line of revolving credit and is presently in debt for $5 million, which Adams said "is none to speak of."

The company has 32,000 units installed in 38 countries. It is presently trying to expand its applications areas again by getting into the government marketing sector by arranging for General Services Administration contract proposals, Adams said.

Executive Corner

- Louis H. Benzig has been elected to the board of directors of Decision Data Computer Corp. to replace Loren A. Scholtz, who resigned.
- Steven R. Gerbsman has been appointed president of the Network Communications Division of Itel Corp.'s Data Services Group.
- Ronald O. Huch has been named president and chief executive officer of Dataroyal, Inc.
- John T. Kohler has been promoted to director of consulting services for Consumer Systems Corp.
- J.M. Tate, formerly president of B-H Computer, was promoted to vice-president of marketing for the professional group at Pace Resources, Inc., its parent company. Robert L. Leiphart was named president of B-H Computer.
- Lee Falco Jr. has been named vice-president and general manager of the Data Products Group of Lear Siegler, Inc.'s Electronic Instrumentation Division.
- Geza E. Gorgenyi has been named vice-president of operations for Educational Data Systems, Inc.
- Jack L. Vandervest has joined Escom/Oregon as marketing director.
- Kenneth E. Wortz has been named vice-president of Data Dimensions, Inc.'s Equipment Division.
- Robert G. Walden has been appointed senior vice-president of finance and administration, a new position, at Logicon, Inc.
- James Perotte has been named vice-president and general manager of Magretech, a division of Magnetic Recovery Technologists, Inc.

HP Develops CMOS/SOS Micro

CUPERTINO, Calif. — Hewlett-Packard Co. has developed a static 16-bit parallel microprocessor with instruction speeds of .5- to 1.5 microsec and a power consumption of 400 mW based on complementary metal oxide semiconductor/silicon on sapphire (CMOS/SOS) technology, according to a technical paper delivered by HP engineer Lam-Giang Dang.

The device described by Dang is optimized for controller applications and features asynchronous memory and I/O operation. The chip has about 10,000 transistors in 34 square millimeters.

HP's CMOS/SOS lab is three years old, but this was the first public announcement of developments being made there, the firm acknowledged.

AKP
VOLUME
KEY PUNCHING
(402) 592-1686
"QUALITY AT LOWER COST"
AMERICANA KEY PUNCH
4345 South 89th St.
Omaha, Nebraska 68127

Data Entry
...OCR
...Type And Scan
...Keydisk
Combine And Save
Security Pacific Optimation Services
611 N. Brand Glendale, Ca 91203
Contact: Jim Feeley
213-956-2424

SPECIAL
DECwriter II
$1550.00
call: (214) 252-7502
TWX 910-860-5761
TELEX 73-0022
vardon & associates. Inc.
930 N BELTLINE ROAD IRVING TEXAS 75061

The Washington Metropolitan Area Transit Authority intends to procure an Automated Information Directory System (AIDS) for use in the distribution to the public of information concerning Metrorail and Metrobus operations.

Effort under this contract shall include the development of a data base and the design of a computer based system, including software, to perform the functions of AIDS, Contract No. 2Y9199.

This procurement shall be competitively negotiated, and shall include thye separate evaluations of technical and cost proposals.

A Request for Proposal document will be available on or about February 22, 1977. Please submit your request for a copy to:

WMATA, Ofc. of Mktg., 600 Fifth St. NW, Wash., DC 20001.

LARGE VOLUME
KEYPUNCH/KEYDISC
SERVICES
DATA-MIDWEST
minnesotas largest
data entry service
(612) 854-1800
'Quality Data at Competative Prices'
keypunch/keydisc ● type/scan ● sys 3 keying ● ocr processing
3050 METRO DRIVE — MINNEAPOLIS, MINN. 55420
A DIVISION OF DATA SYSTEMS INC

FIND MINI-SOFTWARE SERVICES FAST

MINICOMPUTER
SOFTWARE DIRECTORY
Instant access to descriptions of hundreds of minicomputer software packages and services.
DIRECTORY INDEXED 4 WAYS
- Indexed by applications and services
- Profiles of supplier companies
- Geographic locator
- CPU's supported by suppliers

Annual Subscription $70
INITIAL ISSUE plus 2 updates Send check or PO
MINICOMPUTER DATA SERVICES
20 COVENTRY LANE, RIVERSIDE, CT. 06878

NEEDED IMMEDIATELY
Top Prices Paid for Ranted or Owned
IBM 3277-2 CRT's
With large screen
Will also buy for futura delivery
CALL COLLECT OR WRITE
BERLENT INDUSTRIES INC.
1975 Hampstead Turnpika
East Meadow, N.Y. 11554 (516) 794-9722
Computer Dealers Association

System/3 — Models 4 and 6
PRINTBOUND?
Upgrading to satisfy increased print requirements?
DON'T!
Our DAC/3-400-550-750LPM printers can be interfaced to your system/3 to expand its capability.
Call or write today!
Digital Associates Corporation
1039 E. Main Street, Stamford, Ct., 06902 (203)327-9210
Printers for ALL Models of System/3.

165K Model 2
IBM Memory
Delivery August 1977
$45,000/month
36-month lease.
Principals only.
Box

CW Box 4949
797 Washington Street
Newton, Mass. 02160

The special Computer Designer Forums held in 5 cities – in conjunction with

COMPUTER EXPO 77

Sign up now for the Computer Designer Event of the year!

Register now to participate in a city near you — and also attend *free* the largest multi-city computer show of the year.

Each of the Computer Designer Forums will be conducted by a leading digital engineer or independent consultant who will lead seminars and workshops on these relevant, up-to-date topics:

Tuesday: Evaluating and Using Microprocessors — Applications of Microprocessors and Microcomputers; Interfacing and Integrating; Emerging Applications; Panel Discussion.

Wednesday: Evaluating Peripherals for Mini - and Microcomputers — I/O Devices; Magnetic Media and Its Future; Panel Discussion.

All Forums will take place from 9 AM to 1 PM.

Thursday: Evaluating Memory and Storage Devices — Bubble Memory: The Future; CCDs vs. MOS; Today's Technology in Tomorrow's Products; Panel Discussion.

Concurrently, hundreds of exhibitor products and services will be shown at Computer Expo 77 each day from 10 AM to 5 PM.
There is no admission charge to the exhibit hall.

See the latest and the best in:
Minicomputers, Printers, Microcomputers, Microprocessors, Printer Terminals, ROMs and RAMs, Flexible Disk Drives, Power Supplies, Keyboards, Modems, Readouts and Displays, Cassette Systems, Magnetic Tape Transports, Core Memories, Graphics Systems, Miniperipherals, Small Business Computers, Software, Data Communications Equipment, and more!

HOW TO REGISTER FOR THE FORUMS

(No advance registration or admission charge is required of qualified executives for the Computer EXPO program — including exhibit hall and exhibitor seminars. Your business card will admit you.)

Send to:
Designer Forums
Computer EXPO 77
797 Washington Street
Newton, MA 02160
(617) 965-5800

Register me for ☐ all three days
☐ Tuesday
☐ Wednesday
☐ Thursday

Name ____________________ Title ____________
Company ____________________
Street and Number ____________________ City ____________
State ____________ Zip ____________ Telephone (______) ____________

Check city in which you plan to attend:
(your acknowledgement form will include complete details on times and locations)

☐ San Francisco	March 29-31, San Francisco Civic Auditorium
☐ Los Angeles	April 5-7, Los Angeles Convention Center
Cleveland	April 19-21, Cleveland Convention Center*
Minneapolis/St Paul	April 26-28, St. Paul Civic Center*
☐ Chicago	May 3-5, McCormick Place
☐ New York	May 10-12, New York Coliseum
Philadelphia	May 24-26, Philadelphia Civic Center*
Washington, D.C.	May 31-June 2, Sheraton Park Hotel*
☐ Boston	June 7-9, Northeast Trade Center (Rte. 128, exit 39)

(Registration for any single forum day entitles you to attend all three days of exhibits. If you wish to attend the exhibits only, no advance registration is required.)

☐ Check Enclosed ☐ Purchase Order Enclosed ☐ Charge my American Express

Cardholder Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiration Date ____________________

Cardholder Signature ____________________

PAYMENT RECEIVED
☐ $45.00 One Forum Day ☐ $80.00 Two Forum Days ☐ $115.00 Three Forum Days

COMPUTER CARAVAN 77

A division of Computerworld, Inc.
797 Washington Street, Newton, MA 02160

*No designer Forum in these cities — but EXPO and User Forum are held.

Please Circle 1 Number in Each Category

BUSINESS/INDUSTRY
10 Manufacturer of Computer or DP Hardware/Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail/Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government — Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other ____________

TITLE/OCCUPATION/FUNCTION
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/Administrative Service
22 Director/Manager Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg. Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other ____________

Do it now.

Five Crucial Factors Cited for OEM Selection of Mini

IRVINE, Calif. — For the OEM, five main features are of utmost importance in selecting a minicomputer: cost, compatibility, reliability, availability and capability, according to David Coulson, sales support analyst for Computer Automation, Inc. (CA).

In terms of cost, the OEM has to consider not only what he pays the vendor, but also the hidden costs he accrues, such as front-end design costs and maintenance costs, Coulson noted.

He should consider total systems cost — CPU, memory, I/O controllers, chassis, power supply, control console and software charges. By taking advantage of advanced techniques, such as CA's Distributed I/O system, the overall system cost can be reduced, he suggested.

The OEM must also look for a vendor who offers a full range of machines with total compatibility of hardware and software throughout the entire line. This will allow him to configure his system to suit the needs of both small and large users, for instance, without having to redesign his software or interfaces, he said.

Reliability is of very high importance to the OEM since his reputation depends upon it. If the minicomputer he incorporates into his system goes down, he is the one who looks bad since he was responsible for the choice of that machine, Coulson pointed out.

The OEM should examine carefully the factory test procedures used by the mini supplier, he said. A minicomputer which has survived a rigorous series of burn-in, temperature cycling, shock and vibration tests is much more likely to give years of trouble-free operation, since early-life failures will occur in the factory.

The OEM should therefore look for some measure of security, such as a one-year warranty, he said.

While an end user may be able to accept a six- or nine-month lead time without undue inconvenience, the OEM cannot. He expects off-the-shelf delivery since he cannot project his orders as far out into the future as some vendors' delivery times require, Coulson noted, adding the OEM treats a minicomputer as a component and expects to find it in stock when he needs it.

Questions on Capability

Finally, in the area of both hardware and software capability, Coulson said such items as the power of the computer should be evaluated. The instruction execution time, size of instruction set and number of addressing modes should all be factored together to provide a measure of computer power.

What is the range of memory types? Are core, random-access memory, read-only memory, programmable read-only memory and erasable programmable read-only memory available on all machines in the range? Can memory types be intermixed? Is there flexibility in packaging? Can the OEM order a "naked" CPU, memory on a single card or a complete packaged system to suit his exact requirements? Coulson asked.

What about I/O capabilities? What alternatives are available to allow the OEM to make optimum trade-offs between software and hardware capabilities? Is high-speed DMA available? Can he purchase I/O controllers without peripherals?

The OEM usually wishes to choose his own peripherals and negotiate a price directly with the peripheral supplier, he said.

Minicomputer manufacturers who supply both OEMs and end users produce machines which are a compromise between the needs of each marketplace. The OEM should therefore deal with an OEM specialist if he wants fast delivery at minimum cost for a highly reliable product, Coulson suggested.

Orders & Installations

Armour-Dial, Inc. has ordered a complete computer automation system from General Automation, Inc. for its meat canning facility in Fort Madison, Iowa, and its soap plant in Aurora, Ill. General Automation will provide six GA-16/440 systems, program management, application software, hardware system design and electrical subcontracts for the installation.

Cordis Dow Corp. of Miami, manufacturer of artificial kidneys, has installed a Univac 90/30 system as part of a network linking its headquarters with manufacturing facilities in Miami Lakes, Fla., and Concord, Calif., and with connections to the firm's European headquarters in Brussels, Belgium, and a manufacturing site in Roden, Holland.

Thirteen Anthony's department stores in the greater Oklahoma City area are installing NCR 279 financial terminals to provide electronic banking links to the Oklahoma City National Sharedata computer center.

Bell Telephone Laboratories in Marray Hill, N.J., has ordered an S220 system from Harris Computer Systems.

Mobil Oil Credit Corp. has ordered four Trace document processing systems valued at $3.2 million from Recognition Equipment, Inc.

The *Trenton Times* is installing a T-410 publishing system from Tal-Star Computer Systems, Inc. to be used for editing and processing of local news, wire services, classified and display advertising and on-line real-time circulation updating.

Bashas Markets of Phoenix has installed an NCR Criterion for on-line application programs for buyers and warehouse operations and for payroll, order entry and accounting applications.

Express System Discrepancy Causes Dissension

(Continued from Page 51)

the price, nine months after the date it was due.

In an interview, Microdata's President Donald Fuller stated emphatically that Express is still OK as originally conceived, "it's just that at this stage of the game we're retrenching somewhat in terms of what we think we can do this calendar year."

Why the discrepancy between the announced Express and the one which will be delivered in the third quarter? Because of internal upheavals and dealer "blackmail," according to an OEM who asked not to be named as there is the possibility of litigation in this case.

Fuller blamed over-optimistic development and production schedules.

Microdata has recently gone through a series of large personnel layoffs. Industry estimates are that about 300 people have left in the last few months.

Among these were the vice-presidents responsible for design of Emos and the disk controller, the OEM charged.

Fuller, however, denied that any executives in charge of Express development programs have been terminated.

Whatever the cause, there is no argument that Emos is far behind schedule. Due to go into Alpha testing in December 1976, it is only now reaching that stage. No significant deliveries are expected until August, Fuller indicated.

Unique Dealer Arrangement

The OEM was more concerned with the role he alleged the dealers played in raising the system's price.

Microdata's arrangement with its Reality dealers is rather unique in the industry; they have exclusive capability to sell Reality in a geographic area and are constrained not to sell any other system.

The announcement of Express, a far more powerful and versatile machine, at least on paper, gave the distributors a nasty jolt since they were initially constrained so they could not sell it, both the OEM and Ted Sabarese, president of the dealers' association, agreed.

There is no question the dealers and Microdata's top management have met frequently since NCC. The matters discussed and the outcome are points of disagreement.

A Form of Blackmail

The end result, according to the OEM, was a form of blackmail where dealers said: Unless you sell this system for a lot more money and all sales, and incidentally all commissions, go through us, we won't sell Reality.

No one can blame the dealers, he said. They wanted to lessen competition with Reality as well as increase their profits.

A basic Reality costs about $50,000; if a more powerful machine — Express — sold for $20,000, they stood to lose a lot of business from Reality to OEMs who could undercut them.

Sabarese conceded there was a point in time when the dealers were not able to sell Express, "but that has all been settled now."

The price increase, however, is not a result of any demands or efforts by the dealers, he emphasized, speculating that Microdata had underestimated development and manufacturing costs.

Asked whether he agreed that Express would finally appear as "half the system at twice the price," Sabarese said that was the case "in a limited sense," noting, as Fuller did, that all features would eventually be available.

He said the meetings were held because the dealers felt Fuller "did not fully understand some of the implications" of the situation in which dealers were constrained from selling Express. The dealers did not want Express to knock Reality out of a deal, he said.

"After running through some problematic situations, [Fuller] realized that this could happen," Sabarese said, "so both products will now be channeled through the dealers who will then work closely with the OEM," he stated, adding dealers will recommend a user go to an OEM if the added value suits that user's needs.

"And we will work with the OEM," he stressed.

The OEM speculated that while OEMs can now buy directly from Microdata, the price will be higher since, as a result of the meetings, the dealers "will get some dollars from anything Microdata sells to an OEM."

Fuller denied any trouble with the dealers and affirmed the company's policy to sell directly to OEMs as well as through dealers.

"But whether the OEM buys through a dealer or directly from us, the price will be the same," he stated, indicating that what would amount to the dealer's commission would in essence be charged as support and marketing costs for a Microdata-OEM sale.

"OEMs may feel that [the dealers' association] has caused the problem, but what really happened — and it was a clear decision on my part — [was] that because the software was late, I didn't feel I could take the risk of also introducing another possible perturbation by having new peripherals and new software in the marketplace at the same time.

"Frankly, it was a cautionary move on my part," he said.

Microdata's Side

The basic underlying problem for Express was an underestimation of the development time required for its new operating system, Fuller stated.

As a result of the three- to four-month delay, Microdata had to change its corporate strategy somewhat.

"There is nothing changed in the software," Fuller indicated, "but we have changed the hardware around somewhat. To limit our risk . . . we decided not to put the new peripherals on the Express in the early deliveries."

Instead, Express will make its debut with the Emos software and with older, more expensive peripherals which accounts for the difference in announced and actual prices, he said.

Fuller attributed part of the "retrenchment" decision to the OEMs, noting "we didn't expect OEMs to go out and put [Express] in end user applications as rapidly as they were intending to do. We tried to dissuade them from doing that.

"We felt OEMs were taking undue risks [by trying to get the system to the end user in an unproven application], but that's not something we have any control over," Fuller noted.

"But when the dust finally settled, we did not want to have a new software system and all new peripherals in the marketplace in a short timeframe," he said, indicating that was the rationale for the older peripherals.

These corporate decisions have not limited the system's performance fundamentally, only initially, Fuller said.

Express will do everything Microdata promised, but not in the short term, he added.

Contracts

TRW, Inc. has been awarded a $309 million contract by Western Union Space Communications, Inc. to build communications satellites for the National Aeronautics and Space Administration's Tracking and Data Relay Satellite System.

Ontel Corp. has received a $10 million contract from AEG-Telefanken for microcomputers.

Control Data Corp. has been awarded a contract by Security Pacific National Bank to install an Automated Money Transfer System.

GTE Sylvania, Inc. has received a $1.4 million contract from the U.S. Army for installation of a computer-controlled data processing, storage and retrieval system.

Utility Network of America has signed a contract with Paragon Data Systems for the utilization of a large-scale computer center in Kansas City.

Boeing Computer Services, Inc. has been awarded a five-year $1.1 million contract by the U.S. Air Force to provide software support services for the E-3A airborne warning and control system.

Bank of America has signed a contract with Rapidata, Inc. to offer computerized deposit and balance reporting to the bank's corporate customers using Rapidata's nationwide remote access computers.

Sanders Associates, Inc. has received a contract from the U.S. Air Force for an Area Control Center Display System that will be installed at the Vandenberg Air Force Base center to monitor and control aircraft operating in offshore test areas between San Francisco and San Diego.

Southeast Banking Corp. has signed a contract with Automatic Data Processing, Inc. for a state- and nationwide payroll processing system.

Credits Industry Orientation

Aerospace Contractor Takes Off in Service Mart

By E. Drake Lundell Jr.
Of the CW Staff

BALTIMORE — In the late 1960s many large defense and space contractors saddled with large computer facilities but faced with shrinking markets and recessionary pressures decided to sell their computer expertise on the open market.

But today it is hard to find many that succeeded in that effort — except for Martin Marietta Data Systems (MMDS), headquartered here.

There are several reasons for the firm's success, which is profitable with revenues of around $40 million annually, according to President Barry Rowe.

The firm has an advantage because it processes a great deal of work for Martin Marietta, its parent company, Rowe noted, even though that work only accounts for about 50% of its present revenues, a percentage that has been declining over the past few years.

Emphasis on Manufacturing

More important, according to Rowe, is the industry orientation followed by MMDS.

The firm has focused primarily on manufacturing in all phases of its business, which is split roughly into thirds between remote services, application systems and resource and facilities management, he said.

The manufacturing part of the business was a "neglected industry" in the 1960s, he said, and the pent-up market demand coupled with the in-house expertise of Martin Marietta bred success when the Data Systems division was set up.

MMDS primarily aimed at the middle to upper end of the manufacturing marketplace, he said, designing its systems for firms with typically over $20 million in revenues.

This market orientation helped particularly in the early days, Rowe indicated, since prospective customers were faced with recessionary pressures and high people costs which made them look for more efficient ways to conduct their business.

Modular Approach

Another factor in the success of the venture has been its modular approach toward the services it supplies, Rowe believes.

MMDS, he said, offers the full range of services from consulting through systems design to proprietary software. In addition it will supply computer power on a remote basis or will run a DP shop for a user on a facilities management basis. The firm also offers services for training and educating personnel within user organizations.

This modularity of service allows a customer to determine and get only those services he really needs, Rowe said. A user does not have to take services that are not needed in order to get the ones he wants, but rather can tailor the level of support received from MMDS to his specific needs, he added.

This concept applies not only to the services side of the business, but also to the applications software side, Rowe indicated, where MMDS can effectively offer users "custom" systems made up of various off-the-shelf modules in the firm's Modular Applications Systems (MAS) package. Once again, the user is not forced to take more — or less — than he really needs, Rowe indicated.

Concern for User

Along with this modular approach goes a feeling for real user needs and not just technology, according to Rowe. "We have to remember that technology is fascinating for us, but not quite that interesting to users," he said.

Timely Reports

The users are less worried about the technology than about getting reports that are both timely and accurate and systems that are delivered on time and work, he added.

While many of the aerospace firms who entered the computer services marketplace in the late '60s attempted to compete on just a price basis by offering time at low rates with few services, MMDS does not compete on a processing price basis, but rather on a full service basis, Rowe said.

This emphasizes the major difference between MMDS and those other aerospace conglomerates. MMDS actually became a "member of the industry" and not just an outsider selling time, according to Rowe.

Small Firm Attitude

To accomplish this, the firm has fostered a small company attitude internally, he indicated, with each part of its operation run as a profit center.

While Rowe personally reports monthly on the state of the business and the profits or losses to its parent firm, the rest of MMDS functions pretty much like a small concern, he said, with profit incentives of the managers involved in each of its operations.

At the same time, MMDS enjoys the advantages of the large corporation identity, he indicated, because users are assured it is going to stay in the business and that it has the financial strength and the reputation of a successful company behind it.

Burroughs Facing Import Penalties

DETROIT — The U.S. Customs Service is seeking civil penalties totaling about $42.5 million from Burroughs Corp. in connection with the import of parts and assemblies through the Port of Los Angeles.

The Customs Services claimed Burroughs underpaid duties on the items by about $370,000. The $42.5 million penalty is based on a Customs Service estimate of the domestic value of the imported parts and assemblies, according to a Burroughs spokesman.

Burroughs plans to contest the amount of the penalty as "clearly excessive," he said, adding the claimed amount of underpaid duties is "unsupported."

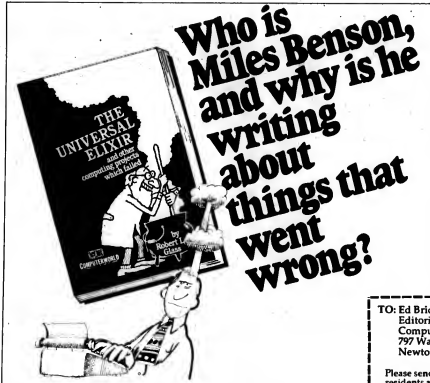
Burroughs believes the penalties will be reduced to an amount "bearing some reasonable relationship to the demonstrable loss of revenues."

Remote Services Marketing Slated as Seminar Subject

NEW YORK — A two-day seminar on marketing to the remote computer services industry is scheduled at the Harvard Club here May 2-3.

Sponsored by the market research firm of Frost & Sullivan, Inc. and Info-Dyne, Inc., a remote computing consulting firm, the seminar will include sessions on vending techniques, sales, marketing and planning strategies, corporate programming outlooks, management trends and product development.

Further information is available from Robert Sanzo at Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.


Who is Miles Benson, and why is he writing about things that went wrong?
THE UNIVERSAL ELIXIR
and other computing projects which failed
by Robert L. Glass
COMPUTERWORLD

Not many people aspire to become experts on failure, but the man behind the pseudonym "Miles Benson" has made a career-long hobby of things that go wrong in the computer business. Collecting information from contacts around the country, "Miles" retires to the back seat of his Studebaker where, for several years, he has turned out columns on catastrophes (and less spectacular failures) for *Computerworld*. Now he has compiled the best of the worst into a single book:

"THE UNIVERSAL ELIXIR AND OTHER COMPUTING PROJECTS WHICH FAILED."

Published by *Computerworld*, this unique treatise on tragedy contains a series of startling stories like these:

- **How to Succeed at Admitting Failure**
- **An Exerciae in Elaborate Inefficiency**
- **The Charlatan and the Nuclear Computer**
- **The Right Decision – at the Wrong Time**
- **The Compiler Whose Beauty Was Skin Deep**
- **The Air Traffic Control Diversification Disaater**
- **The Sandbagged Computer Selection**
- **Turning the Empire State Building into a Church**

PLUS (as if anyone cared) "Miles Benson" reveals the man behind the name – the true devotee of disaster and author of this entertaining, instructive – (and occasionally frightening) – book.

Don't fail to get this feast of failuresl Success stories are everywhere (true or not), but there's more to be learned from failures. Unfortunately, failure is an orphan, and no-one wants to talk about it. This is your chance to get the straight story about some of the more interesting SNAFU's in the computer business. Don't miss it! Send in the coupon today.

TO: Ed Bride
Editorial Services Dept.
Computerworld
797 Washington Street
Newton, MA 02160

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Please send me ______ copies of the *Universal Elixir* at $7.50 each (Mass. residents add 5% sales tax), plus $1.50 postage and handling for the first book (CW pays postage and handling on additional copies). My check for ______ is enclosed. (____ I can't enclose a check, so send me a bill. *I understand that you can't ship books until you receive payment.)*

Name ______

Company ______

Address ______

City ______ State ______ Zip ______

Now you can advertise in five leading computer publications, in five major export markets-in one simple step.

COMPUTER MANAGEMENT

UNITED KINGDOM

World rank as DP market: *Fourth*
1975 DP expenditures: *$2.7 Billion*
1975 imports from US: *$270 Million*
Rank as importer from US: *Third*

Computer Management is a monthly magazine recently purchased by *Computerworld, Inc.* Monthly circulation is 30,000.

COMPUTERWOCHE

GERMANY

World rank as DP market: *Third*
1975 DP expenditures: *$3.7 Billion*
1975 imports from US: *$274 Million*
Rank as importer from US: *Second*

Computerwoche is a weekly tabloid newspaper started by *Computerworld, Inc.* It has a circulation of 21,000 to the West German computer community.

SHUKAN COMPUTER

JAPAN

World rank as DP market: *Second*
1975 DP expenditures: *$4.6 Billion*
1975 imports from US: *$189 Million*
Rank as importer from US: *Fifth*

Shukan is a weekly tabloid newspaper, jointly owned by *Computerworld* and Dempa publications. Circulation is 35,000.

ZERO-UN INFORMATIQUE

FRANCE

World rank as DP market: *Fifth*
1975 DP expenditures: *$2.5 Billion*
1975 imports from US: *$223 Million*
Rank as importer from US: *Fourth*

Computerworld represents Zero-Un Informatique in the US. Zero-Un has three publications, one a weekly tabloid newspaper with circulation of 22,000; the second a monthly magazine, circulating 13,000 copies; and a new bi-weekly, Minis and Micros. All circulate throughout Europe's French speaking computer market.

DATANEWS

BRAZIL

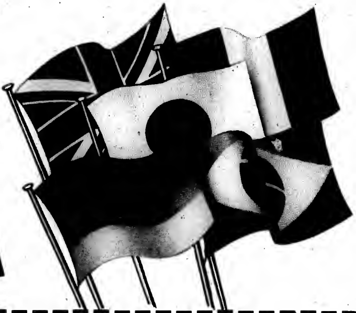
World rank as DP market: *12th*
1975 DP expenditures: *$250 Million*
1975 imports from US: *$60 Million*
Rank as importer from US: *(Est) 10th*

DataNews is a bi-weekly tabloid newspaper in Portuguese with an English-language summary. It is owned by *Computerworld, Inc.* and has a circulation of 7,000.

Computerworld now has sister publications in five leading international markets for US computers and computer-related equipment. These markets import in excess of a billion dollars of US-made computer products. The publications are operated and edited by local experts, and published in the language of the computer people they serve. And they do an excellent job of covering their markets.

To advertise in any of these publications, all you have to do is contact us at *Computerworld*. We can take care of everything, including translation and resetting of your English-language ads. And our International Marketing Services Division can also help you arrange a broad range of marketing services, from market potential studies to marketing operations set-up.

Just send in the coupon, and we'll send you all the details – including market facts on each country.



To: Mike Young, *Sales Manager*
International Marketing Services Division, Computerworld,
797 Washington Street, Newton, MA 02160
(617) 965-5800

I'm interested in your rate card and market facts for the following:

- ☐ Shukan Computer, Japan
- ☐ Computerwoche, Germany
- ☐ DataNews, Brazil
- ☐ Computer Management, United Kingdom
- ☐ Zero-Un Informatique, France
- ☐ **I'd also like information on your marketing services.**

Name________________ Title__________
Company__________________________
Address________________ City__________
State________ Zip________ Phone________

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

POSITION ANNOUNCEMENTS

UNIVERSITY OF WISCONSIN SUPERIOR

Instructor or Assistant Professor to teach undergraduate business administration courses with emphasis on data processing languages and systems beginning with Fall, 1977 quarter. Position involves assignment and supervision of student activities using the PDP 11/70 system. Applicants should possess Master's degree, preferably MBA, as minimum. Application deadline is May 1, 1977. Send resume to Dean, College of Business and Economics, University of Wisconsin, Superior, Wi 54880.

U.W. Superior An Equal Opportunity Employer

TEXAS OPPORTUNITIES

FEE PAID—NO CONTRACT

SYSTEM SOFTWARE to $26K
Entry Level to Heavy Weight 370, SVS, MVS, IMS

PROGRAMMERS 14 to 24K
New Facility. Will consider all levels of experience. COBOL, FORTRAN, PL1, ALC.

ANALYST 18-22K
Manufacturing, Accounting, or Banking Systems.

CALL or SEND RESUME

DUNHILL
Employment Agency
of Forth Worth, Inc.
901 Ridglea Bank Bldg.
Fort Worth, TX 76118
(817) 732-8191

OVERSEAS MVS INTERNALS

Confidential Houston Interview. Work on MVS 3.7 JES 2 TSO TCAM VTAM NCP. Earn 40% salary increase with Tax break & overseas benefits. Six weeks paid vacation each year. State-based salary above $20K.

Call Collect:
SYLVIA B. LONG
(213) 378-1831
or (213) 990-1875

LONG MANAGEMENT CONSULTANTS
15910 Ventura Blvd. Suite 800
Encino, California 91436

MIDDLE EAST

Billion dollar co. seeks unique individual who wants cultural experience of United Arab living. Candidate must be proficient in CICS systems programming, Assembler, DOS & Degreed. Salary 22K plus 65% bonus and housing. Fee paid. Contact Kasie Alexander.

ROBERT HALF
PERSONNEL AGENCIES
88 E. Broad St.
Columbus, Ohio 43205
(614) 221-9300

Programmer Analysts

Money/Travel

Major nationwide consulting firm has an immediate need for Programmer/Analysts in the San Francisco/Los Angeles areas. Relocation expenses paid. The qualified candidates will possess a minimum of two years' experience with IBM 360/370, hdw., OS/COBOL, ALC. Minimal to advanced exposure with IMS/DL1 a MUST. You will receive extensive exposure to DB/DC in this exciting high visibility situation; with salaries to $20K. Call or write:

LOGICAL OPTIONS INC.
233 SANSOME ST SUITE 1300
SAN FRANCISCO, CAL 94104
415/781-0844

An Employer Paid Personnel Service

Electronics

SR. MICRO-PROCESSOR DESIGN ENGINEER

To $26,000

We are a highly successful developer of innovative products, located in Southern California, currently seeking an experienced EE for the design of micro-processors for unusual applications. The candidate we seek will be capable of accepting project responsibility including software implications and the development of custom LSI's. Desire familiarity with hardware and microprogramming; MOS & BIPOLAR technology. Excellent benefits.

CW Box 4955
797 Washington Street
Newton, Mass. 02160

An Equal Opportunity Employer M/F

PROGRAMMER ANALYST

14K-18K

GREATER BEDFORD AREA

Are you an experienced business programmer analyst looking for a challenging career in a medium scale COBOL environment? Can you set and meet your own schedules? Are you interested in all aspects of corporate activities?.

For an opportunity to develop yourself professionally, send your resume and salary crequirements to:

CW Box 4951
797 Washington Street
Newton, Mass. 02160

An Equal Opportunity Employer

SENIOR PROGRAMMER-ANALYST CICS

Fortune 500 company is seeking an outstanding Programmer Analyst for leadership position in CICS application design, programming and implementation.

Candidate must have strong CICS application and programming experience. Excellent opportunity to grow with major MIS professional staff expansion.

Desirable Eastern city in sports/outdoor recreation region. Excellent compensation and fringe benefits package

Send resume and salary, in confidence, to

CW Box 4939
797 Washington St.
Newton, Mass. 02160

COMPUTER SYSTEMS

As one of the midwest's leading multi-divisional management and systems consulting organizations, our steady growth requires top professionals in the following areas:

- Systems Programmers · Specialized in IBM 370/OS and Honeywell 6000.
- Business and Scientific Applications Analysts/Programmers · Experienced in Honeywell 6000 GECOS, IBM 370 series, Burroughs and Xerox systems.
- Real-Time Communication and Process Control Programmers — Experienced in IBM S/7, HP 2100, and Varian 600.

Top salaries, moving allowance and fully-paid fringes including life, health and dental insurance, and educational benefits. Call or send your resume to.

M.I.S. INTERNATIONAL, INC.
31350 Smith Rd.
Romulus, MI 48174
(315) 326-7010
Equal Opportunity Employer

COMPUTER SYSTEMS ENGINEER

Fortune 500 Company, located in St. Louis, Missouri needs an individual to be responsible for analyzing "de-bugging" and converting present software information into meaningful interfaced computer programs throughout corporate departments.

Must have B.S. degree or equivalent experience in Management Systems, Engineering or Math.

4-5 years "hands-on", software conversions and design experience in COBOL including IBM 370/135, UNIVAC 9480, UNIVAC 1100 series or similar size equipment.

Excellent compensation, relocation and benefits programs, including dental benefits.

Forward resume with salary history and requirements as soon as possible to:

Jay Verl
7777 Bonhomme Ave., Suite 1210
Clayton, Missouri 63105

Minicomputer Specialists

AMS is a nationwide management consulting and systems development firm with $12 million in annual sales and five regional offices.

We presently have openings in our San Mateo, California office for two minicomputer software specialists who meet the following criteria:

- 2 years hands-on implementation experience on HP 3000 or PDP 11/70 minis, using manufacturer supplied operating systems
- Order Entry systems experience
- On-line design system
- Five years design/implementation experience
- Some COBOL

Any DBMS design experience would also be helpful.

AMS is a young rapidly growing firm. We provide an exciting and challenging environment where opportunities for individual growth are plentiful.

Salary for these positions will be commensurate with experience and qualifications. Please send resume and salary history to:

Mr. John M. Grilfos
American Management Systems, Inc
561 Pilgrim Drive
San Mateo, Calif. 94404

AMERICAN MANAGEMENT SYSTEMS INC

An Equal Opportunity Employer M/F

Systems Professionals

Come to ski country U.S.A.! Storage Technology Corporation, a leading manufacturer of computer peripheral equipment located next to the Rockies seeks broad gauge professionals with proven track records for the following open positions:

Senior Systems Programmer

Must have extensive DECsystem-10 for DECsystem-20 hardware/software experience. Experience with IBM hardware helpful.

Sales Support

Technical and customer applications support for time sharing and computer services sales. Experience with DECsystem-10 required.

Senior Business Analyst

Must have successfully designed and implemented field inventory systems servicing multiple service center facilities. On-line experience preferred.

Senior Programmer/Analyst

Must have demonstrated experience in successfully dealing with both technical and people problems inherent in implementing management information systems.

We offer excellent salary and comprehensive package of benefits. Please submit resume, including salary history in complete confidence to Al Hunt.

Storage Technology Corporation
2270 South 88th St.
Louisville, Colo. 80027
An equal opportunity employer m/F.

PROGRAMMERS

Step UP to LOGICON

MINI-MICRO/COMPUTER APPLICATIONS

If you're ready to step up to NEW career challenge and NEW growth in mini-micro computer applications, check out professional career opportunities with us. We're the leaders in automated process control systems through the application of computers and electronics with emphasis on industrial and Government civil agency programs. We're now traded on the American Stock Exchange, and we're growing because of our talented people.

You need 2-5 years experience in real-time, mini or micro computer based systems, including design, coding, and testing of modules utilizing assemblers, editors, debuggers and monitors. Knowledge of TI 990 DX10 and Intel 8080 software packages desirable.

Located in a residential suburb of Washington, D.C., close to five universities, libraries and cultural interests as well as the Nation's Capitol, we offer excellent compensation and benefits, and a stimulating work environment.

Please send your resume including salary history in confidence to: B. Heydt.

LOGICON, INC.
Process Systems Division
8300 Merrifield Avenue
Fairfax, Virginia 22030
An Equal Opportunity Employer M/F

Exceptional Opportunities

PROGRAMMER/ANALYST	$18,000 to $24,000
SYSTEMS ANALYST	$18,000 to $27,000
SYSTEMS PROGRAMMER	$21,000 to $30,000

IBM 370/OS/SVS, IBM 370/DOS/VS
IBM 370/DOS/CICS, IBM 370/OS/MVS

Opportunities exist with several major clients throughout the United States. Your background and expertise can be more valuable than you think. For details "RUSH" resume to:

Alan James & Associates

3659 Green Road, Beachwood, Ohio 44122
or call collect(216) 464-5180 days
(216) 562-5848 evenings
A Professional Management Consulting Service

DIRECTOR COMPUTER RESOURCE MANAGEMENT

Low 30's

Fortune 500 service company requires:

- Solid experience in programming and systems design.
- Expert in IBM 370 hardware and operative systems software.
- Recent experience in facilities management or large scale data center.
- Knowledge of advanced operations and management systems in telecommunications environment.
- Mid-Atlantic area.

Successful candidates will assume responsibility for technical services and computer operations nationwide.

Please send resume and salary history in confidence to:

CW Box 4955
797 Washington Street
Newton, Mass. 02160

An Equal Opportunity Employer M/F

FIELD ENGINEERS

Intel's 1976 sales were up 65.2% to $226 million with earnings up 54.9%. The reasons? Strong management. Strong technical talent. And leadership in innovative products, including OEM and add-on memory systems.

Our continued memory system growth has created opportunities for field engineers with at least 2 years of experience with IBM 370 systems or equivalent IBM add-on background. Openings are in a variety of locations, including:

Cleveland
Washington, D.C.
Hartford
Dallas
Cincinnati
Boston
Houston
Los Angeles

To gain immediate and confidential consideration, please send your resume including salary history, to Memory Systems Employment, 1302 N. Mathilda Ave., Sunnyvale, CA 94086.

An Equal Opportunity Employer M/F.

intel
MEMORY SYSTEMS

DIRECTOR
DATA CENTER

New England Corporation seeks executive level operations Mgr to direct lge scale IBM DS/VS Installation. Indiv must have extensive mgmt exp directing lge data center staff. Salary to $38,000+. (Fee paid) Contact Stan Ourbes for additional info.

ROBERT HALF PERSONNEL AGENCIES
111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170

PROJECT/ ACCOUNT MANAGER

Arista, a diversified data services company, is seeking to fill a career position in customer account support. Among our applications are P/R, A/P, A/R, G/L, order entry, order processing, perpetual and physical inventory, production control, sales analysis, and mailing services. Duties include client coordination, marketing support, applications installation, programmer supervision, and programming as needed. Technically a good working knowledge of Cobol in a system 360 DOS environment is required.

Salary depends on ability and experience. Benefits are comprehensive. Location is excellent. If you qualify, send your resume to:

Arista Information Systems, Inc.
P.O. Box 12339
Winston-Salem, N.C. 27107
Att: Clarence N. Dixon, Jr.
V.P. Processing Services

Arista

EDP OPPORTUNITIES IN THE SUNSHINE

We need an EDP assistant director with substantial managerial experience in the implementation of systems based on DB/DC, IPTs and Distributed Network concepts, capable of effectively leading a large staff of EDP professionals dedicated to information system development and Public Safety, Human Resources, Public Finance, and Physical and Economic Planning.

We offer the challenges and diversity of informational requirements in metropolitan government, the rewards of a career in the public service, the advancement opportunities of a large (190 employees) and rapidly growing organization, competitive salaries, and the potential for the good life that the Miami area offers.

Send resume to:

Manuel Garcia, Director
Metropolitan Dade County
Data Processing Division
1351 N.W. 12th St., Room 908
Miami, Florida 33125
(305) 547-7033

Equal Opportunity Employer M/F

IMS PROFESSIONALS ONLY

If you are a programmer programmer/analyst, systems analyst, or EDP professional and would like the most individualized job search offered in the data processing field today on a local or national level, forward your resume, with present salary and geographical preference, in strict confidence, to:

E.D.P. SEARCH, Inc.

P.O. Box 331
Hartford, Conn. 06101

SYSTEMS ANALYST

On Line Systems Development

Expanding operations at Colonial Life has created a career opportunity in a challenging environment with a progressive and professional EDP staff. Growth position. New application development. Design and implementation of computer based on line systems. You should be an aggressive individual with the drive to excel on your own initiative. You should possess good oral and written communication skills and have the ability to deal with all levels of company management.

Please send resume and salary requirements to: 111 Prospect St., East Orange, New Nersey 07017.

COLONIAL LIFE
INSURANCE COMPANY
OF AMERICA

Equal Opportunity Employer M/F

---

dp people inc.

D.P. PEOPLE, INC. is a professional personnel agency specializing in the placement of data processing personnel. Numerous quality D.P. professionals are currently using our agency to seek new job opportunities. If you are responsible for hiring new people for data processing positions within your organization, we invite you to use our services. We do require that our client companies be responsible for our fee. Please call or write us today for a copy of our fee schedule and to allow us the opportunity to serve you.

D.P. PEOPLE, INC.
PERSONNEL AGENCY

P.O. Box 31481
DALLAS, TEXAS 75231
(214)
231-1984

ACCOUNT EXECUTIVES & REPRESENTATIVES

We are a rapidly growing computer services company seeking qualified individuals to represent our professional marketing team in the Florida area as:

Account Executives to prospect, close and develop Fortune 1000 accounts. Knowledge of data processing and finance beneficial, MBA desirable.

Account Representatives to maintain and support local accounts, assist in obtaining new business. BS degree and minimum of 2 years experience in data processing required.

Good benefit program. Corporate headquarters in Columbus, Ohio. Office locations in 22 major cities. Call collect, or send resume to:

COMPU-SERV NETWORK, INC.
5000 Arlington Centre Blvd.
Columbus, Ohio 43220
(614) 457-8600
Attn: Richard Murno, Florida Branch Mgr.

An Equal Opportunity Employer M/F

EDP OPPORTUNITIES

SYSTEMS ANALYST: Implement mfg systems using MRP, COBOL on 370/DOS/VS System. Upstate NY. To $21,000.

PROGRAMMER: Commercial applications. Excellent growth opportunity with Blue Chip firm. COBOL or BAL exp. $15,500.

SOFTWARE PROGRAMMER: Develop software for mini-computer applications. DEC, Varian, Nova or Intel 8080 Assembler exp. $19,000.

PROGRAMMER ANALYST: Develop DBM, CICS System for marketing or financial applications. To $18,000.

BURNS PERSONNEL agency
900 Security Tower
Rochester, N.Y. 14604

INTERNAL CONSULTANT

General Government and
Financial Systems
Regional Information System
County of Lane, Oregon

A large cooperative teleprocessing-oriented data center serving a consortium of local governments (via IBM 158-155) seeks an experienced systems designer with project management experience and a proven record of independent judgment in a local government setting to assist user management with decentralized systems development. The position, reporting directly to the Regional Information Systems Director, is titled Information Systems Manager ($17,264-$23,378 annually, posting #77-14).

Send resume to
Lane County Personnel
125 E. 8th
Eugene, OR 97401

Equal Opportunity Employer

DATA BASE SYSTEMS

Definition, Planning & Design

Michigan Consolidated Gas Co., the largest natural gas distribution company in Michigan, is looking for innovative problem-solvers with in-depth experience in phased conversion to a data base. Working in a 360/370 environment, you will be responsible for the development of long range systems plans within a data base framework.

Preferred candidates will possess a Master's degree in Computer Science, Systems Management or Management Science with experience in designing software for management systems, including large scale data base. The ability to work independently and good communications skills at all technical and management levels are also important.

We offer a very competitive salary, excellent benefits and the growth potential of a major member of the energy community. Please send your resume including salary history and requirements to Professional Placement, Michigan Consolidated Gas Company, One Woodward Avenue, Detroit, Michigan 48226. We are an equal opportunity employer m/f.

MICHIGAN
CONSOLIDATED
GAS COMPANY

Senior Systems Programmer/Analysts

Career Bound?

Make better time with your real-time systems versatility

Philips Medical Systems, Inc., a leader in the field of sophisticated medical diagnostic equipment, has challenging opportunities for outstanding professionals with a strong, real-time systems background.

To qualify, you must have a degree in Electrical Engineering, Math or Computer Science, plus a minimum of 5 years experience in several of the following:

- Assembly language programming in a real-time multitasking environment
- Programming of mathematical algorithms
- PDP-11 Macro assembly language
- RSX-11/M operating system.
- Multiprocessor programming
- Image processing
- Medical data processing
- "Turnkey" systems software configuration and control

We offer excellent starting salaries commensurate with your experience, plus a complete benefits program which includes relocation assistance to our attractive suburban Connecticut headquarters location. For prompt, confidential consideration, send resume with salary history and current requirements to: James J. Crowley

710 Bridgeport Avenue
Shelton, Conn. 06840
An Equal Opportunity Employer M/F

PHILIPS MEDICAL SYSTEMS, INC

MARKETING/SALES and CUSTOMER REPRESENTATIVES

$25,000+

OUR TOP REPRESENTATIVES IN 1976
EARNED WELL OVER $50K

Our business is video taped training sold to the business, government and academic communities. Our results oriented system is in use throughout the world by more than 5000 companies.

If you have successful sales background and a knowledge of D.P., this is a unique opportunity to join the most successful company in the industry.

WE ARE HIRING FOR OUR OFFICES IN:

Atlanta, Boston, Chicago, Cleveland, Dallas, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, St. Louis, San Francisco, Washington, D.C.

To arrange a convenient appointment call TOLL FREE
(800) 323-0311

Performance Through Training

ASI
Advanced Systems Incorporated
and its VAI subsidiaries
A URS COMPANY
An Equal Opportunity Employer Male/Female

EDP/MIS CONSULTING

We are a leading international CPA firm with a well established and accepted management consulting practice. We are continuing to expand at a rapid pace, and as a result have entry level and senior consultant position openings in many of our U.S. offices for EDP/MIS specialists.

Our clients include business, financial, manufacturing, health care and governmental organizations. Typical projects include:

- *Development and implementation of financial and operational information, records and support systems.*
- *Performance evaluations and hardware/software feasibility studies.*
- *Data systems security and internal control reviews.*
- *Long range planning using simulation and other techniques.*

Because of our size and number of offices, most of our consultants average less than twenty per cent travel.

Candidates must possess a high degree of initiative, drive and professional capacity — we are looking for "partner potential". A history of prior successes must be demonstrated by academic achievement and an increasing responsibility/leadership role over 2-6 years in one or more of the above project areas.

We offer a starting salary commensurate with ability, education and experience, and an environment in which you will directly influence your future advancement rate. If this appeals to you, send resume and salary history in strictest confidence to:

CW Box 4872
797 Washington St.
Newton, Mass. 02160
an equal opportunity employer m/f

PROGRAMMER/ANALYST

Enjoy working with clients on a direct basis? Expanding service bureau has brokerage client with time tracking-math or statistics and 1+ years of IBM PL/1
$25,000 (FEE PAID)

ROBERT HALF
PERSONNEL AGENCIES
522 Fifth Avenue
New York, NY 10036
(212) 221-6500

DIRECTOR OF COMPUTING

Oberlin College is seeking a Director of Computing who will be responsible for the planning and management of computing, including a computer facility which has a staff of 16, a budget in excess of $500,000, and a Sigma 9 mainframe. The Director reports to the Vice President/Provost.

Candidates must have a Master's degree and preferably a Ph.D., at least 5 years experience, and demonstrated management ability and technical competence in computing.

Salary range is $21,500 to $32,400; starting salary dependent upon qualifications.

Position is to be filled as soon as possible, preferably by July 1, 1977.

Submit letter of application and resume to James L. Powell, Provost, Oberlin College, Oberlin, Ohio 44074, by April 11, 1977.

Affirmative Action (M/F) Equal Opportunity Employer

DIRECTOR OF INFORMATION PROCESSING

Private liberal arts college of 1500 students searching for Director of Information Processing. Position available June 1, 1977. Responsible for overseeing design and development of administrative and instructional computer applications, and operation of computer center. Quincy College is a member of the University of Iowa computer network and has access to its IBM 360-65 computer through a batch processing terminal. Upon installation of interactive terminals in June, timesharing capabilities will also be available. Administrative experience with academic background preferred. Send resumes with salary history to Paul Brown, Assistant to President: QUINCY COLLEGE, Quincy, Ill. 62301

An Equal Opportunity Employer

Computer Center Director

Georgia State University is accepting applications for the position of Computer Ctr. Director.

Duties include policy determination, development and management of a computer center with a staff of 63 currently utilizing two Univac 70/7's. This position carries faculty rank or status and reports to the Vice President of Research and Academic Sciences.

Advanced academic degrees and previous experience in computer management are desirable. Salary will be commensurate wtwith experience and qualifications.

Send applications including resume and four references to Chairman, Search Committee Computer Center Director, Box Number 860, Georgia State University, University Plaza, Atlanta, Ga. 30303.

Deadline for receipt of applications is Friday, April 15, 1977.

Georgia State University is an equal opportunity affirmative action employer.

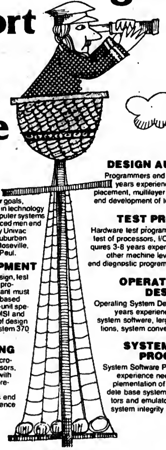
SYSTEMS ANALYSIS AND PROGRAMMING MANAGER

(PROGRAMMER ANALYST 4)

for county governmental agency using teleprocessing-oriented IBM 370/155, 370/158. Responsible for systems design and maintenance, program evaluation, management of departmental D.P. programming and operational staff, coordination with intergovernmental agencies and central D.P. operations. Background in mini-computer applications and distributed processing desirable. Responsible to dept. operations manager. Starting salary $16,700-$19,600. RESUME to Chris Tompkins, Dept. of Assessment & Taxation, Lane County Courthouse, Eugene, OR 97401. An Equal Opportunity Employer.

- COMPUTER DESIGN ENGINEERS
- COMPUTER SOFTWARE DESIGN PROGRAMMERS
- COMPUTER TEST PROGRAMMERS

Does your professional growth fall short of the goals you've set?



If your career has stopped short of your goals, think about this option. New advances in technology in the design and development of computer systems require immediate staffing of experienced men and women to join us in either of two Sperry Univac facilities. These new openings are in suburban Philadelphia, in Blue Bell, Pa., and in Roseville, Minnesota outside of Minneapolis-St. Paul.

COMPUTER DEVELOPMENT

Logic Designers with experience in design, test and manufacturing release of digital processors and I/O access units. Applicant must be capable of designing from broad based specifications as well as creating sub-unit specifications. Recent experience with MSI and SSI circuit technology and utilization of design automation techniques is desired. System 370 experience is a plus.

MICROPROGRAMMING

Two or more years experience in microprogramming or emulation of processors, controllers systems, etc. Familiarity with both hardware logic and software is required. Design and programming of emulators, software support vehicles and diagnostic microprogramming experience is desirable.

DESIGN AUTOMATION

Programmers and Systems Planners with 3-7 years experience in logic, simulation, logic placement, multilayer routing, artwork generation and development of test specifications.

TEST PROGRAMMERS

Hardware test programmers needed for prototype test of processors, I/O systems and devices. Requires 3-8 years experience in BAL, microcode or other machine level language. Hardware test and diagnostic programming experience desirable.

OPERATING SYSTEM DESIGNERS

Operating System Design personnel with 3-12 years experience needed for the design of system software, large scale data base applications, system conversion and communications.

SYSTEMS SOFTWARE PROGRAMMERS

System Software Programmers with 3-8 years experience needed for the design and implementation of operating system software, data base systems, communications, simulators and emulators. Also needed to perform system integrity and integration activities.

Mr. S.C. Anderson
Sperry Univac
P.O. Box 3942-Dept. C.W.
St. Paul, Minn. 55165

If your experience matches our requirements, submit your resume and salary requirements to:

Ms. Nancy V. Orr
Sperry Univac
P.O. Box 500-Dept. C.W.
Blue BellPa. 19422

SPERRY UNIVAC
COMPUTER SYSTEMS

An Equal Opportunity Employer, M/F

SYSTEMS MANAGER

Fortune 500 company in the South Bend Mishawaka area has an opening for a Financial Marketing Systems Manager. Individuals applying should have the following background: sound financial marketing systems experience, 8-10 years in data processing, IBM 370 DOS/VS experience, job shop manufacturing background, on-line systems development and implementation and project management background.

Competitive salary excellent fringe benefits with a challenging position with an excellent potential for growth. Interested parties should submit a complete resume to:

WHEELABRATOR-FRYE INC.

400 S. Byrkit
Misheweke, Indiana 46544
An Equal Opportunity Employer M/F

Data Processing

Large Scale Programs & Opportunities

Here's your opportunity to be instrumental in the development of new systems to support large scale FINANCIAL, OPERATIONAL, ENGINEERING and RESERVATION functions of a nationwide corporation. Openings for senior and mid-level personnel are now available. Join us and grow.

Real Time Communications Programmers

Requires on-line experience for systems development in Assembler language, maintenance, program testing, and the installation of COC and PDP equipment.

Programmer & Programmer/Analyst

Requires extensive experience in the design and implementation of applications in an IBM OS/MVT or VS environment using MARK IV, COBOL, FORTRAN, TSO, IMS, IBM 3790 programming helpful.

Operations Production Technical Support

Requires 1-2 years experience in coding and debugging IBM 360/370 OS JCL, analysis and resolution of production abends, OS utilities, operations documentation review and turnover. Knowledge of MVS, TSO and hands-on computer operations helpful.

Systems Programmer

Requires experience in such areas as: MVS, JES II, TSO/TCAM, VTAM/NCP, VSAM, IMS, and multiple languages, including ALC, COBOL, FORTRAN OR MARK IV. Must possess ability to provide fast problem resolution, analyze and interpret performance data, recommend and develop standards.

We offer excellent salaries, benefits and growth opportunitiess. Send resume including salary history in strict confidence to. J.R Brune, Dept. 002.

Amtrak

AMTRAK
955 L'Enfent Pleze SW
Washington, D.C. 20024

An Equal Opportunity Employer M/F

TECHNICAL SERVICES

The Corporate Technical Services Department of Champion International Corporation, a $3.5 billion forest products company, has immediate openings in our Hamilton, Ohio facility.

SYSTEMS PROGRAMMER

General assignments will be in systems software on a dual IBM 370/155 OS/MVT configuration. This will involve a wide range of developmental activities including analysis of systems performance, data communication and software development. The ideal candidate will have at least 6 years of large scale DP experience, with 3 years concentrated in software. In-depth knowledge of OS and assembler language is essential in addition to strong abilities in communicating with others. A degree in Computer Science is preferred.

DP Training Specialist

This position involves in-house teaching of OS/370, JCL, COBOL, structure programming, etc., writing standards for large scale data center and developing training programs for data processing trainees. The ideal candidate will have 5 years of large scale DP experience which includes experience in training activities with in-depth knowledge of COBOL and JCL. Must have strong communications skills. A degree in Computer Science is preferred.

In addition to a competitive salary, we offer an outstanding benefit package which includes company paid medical and dental insurance and a non-contributory retirement program.

Forward your resume and salary requirements in confidence to Dennis Yamasaki, Personnel Manager, Champion International Corporation, Knightsbridge Drive, Hamilton, Ohio 45020. (No agency referrals at this time).

We take affirmative action towards equal opportunity employment

Champion International Corporation

Finding the best is what we do best.

Our staff is expert at finding "the best person for the job." Most of our placement managers are C.P.A.'s, C.A.'s, controllers or systems managers, the largest most experienced financial, banking and data processing service in the world.

We have expanded to 50 offices throughout the United States, Canada and also Great Britain.

We believe the combined talent and skill of Robert Half employees made us what we are today.

Maybe we're just what you're looking for.

ROBERT HALF PERSONNEL AGENCIES

World's Largest Financial & EDP Personnel Specialists.

Call us.
We're in the White Pages
in key areas throughout the
United States,
Canada and Great Britain.

MODEM/MULTIPLEXER SALES REPS

Aggressive sales reps needed in several U.S. locations to represent major manufacturer of Bell, IBM and CCITT compatible modems, frequency division multiplexers, synchronous and asynchronous line drivers and related accessories. Great backup, attractive commissions. Call, write, or visit us in Booth 241 at Interface '77.

Prentice

795 San Antonio Rd.
Palo Alto, CA 94303
(415) 494-7225

BORROUGHS PROFESSIONALS ONLY

If you are a programmer programmer/analyst, systems analyst, or EDP professional and would like the most individualized job search offered in the data processing field today on a local or national level, forward your resume, with present salary and geographical preference, in strict confidence, to:

E.D.P. SEARCH, Inc.

P.O. Box 331
Hartford, Conn. 06101

Systems Programmer

Minimum 2 years operating systems/data communications experience. Current system includes academic and administrative batch and administrstrative teleprocessing plus academic timesharing. IBM 370, VSI environment. College town of 25,000 located in Upper Michigan.

Apply Personnel Office
Northern Michigan University
Marquette, Michigan 49855
An Affirmative Action/Equal Opportunity Employer

PROGRAMMERS AND ANALYSTS

Free Employment Service
Northeast, Southeast & Midwest U.S.

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agency for Computer Professionals

Senior Programmer/Analysts

We're looking for several imaginative Programmer/Analysts who possess the ability to understand things from a users' point of view and to translate computer terminology and concepts into the language of the manufacturing business. These positions require sound technical knowledge of programming languages (particularly COBOL), operating systems, and hardware and software capabilities and their use. In addition, you should be capable of estimating your own time and make realistic commitments, be adaptable to a rapidly changing environment, and possess good communication skills. A theoretical background in manufacturing and/or business is also desirable, which could be satisfied by a BS in management or equivalent.

In one position, you'll be working directly with specific members of the Manufacturing Planning corporate organization, analyzing their computer-related problems, proposing solutions, and designing, coding and implementing those solutions. You may at times act as technical leader of a project team if a particular solution to a user problem requires extensive programming support. For this position, a data base background would be desirable, specifically with familiarity in data base management systems.

Another one of the avaiable positions will have you working directly with members of the Functional Materials organization. You'll be analyzing their computer-related problems, proposing solutions, and designing, coding, and implementing those solutions. If a particular solution to a user problem requires extensive programming support, you may be required to act as a technical leader to a project team.

Forward resume outlining salary history to Frenk Thompson, Digital Equipment Corporation, Dept. R328, 162 Main Street, Meynard, Massachusetts 01754.

digital
digital equipment corporation
an equal opportunity employer m/f

SECURITY

"Big 8" CPA firm seeks aggressive Sr. EOP consultant for Baltimore MAS staff. MS, MBA or CPA with 1-3 years exp., any equipment. $25K. Call or write Pat Southerland in strictest confidence.

ROBERT HALF
PERSONNEL AGENCIES
217 Quadrangle
Baltimore, Md.
(301) 323-7700

PROGRAMMER ANALYST I

S.F. Bay Area Community College seeking qualified individual to assist with the design, development, and implementation of new timesharing and batch systems on OEC System 10; provide technical guidance to faculty and students. Must have a broad range of skills and experience in design and implementation of systems, preferably in a college environment. Minimum 3 years experience in systems and programming. B.S. degree desirable in data processing or computer science. Salary: $1,205-$1,448 mo. Apply to Solano Community College, P.O. Box 246, Suisun City, CA 94585. Deadline date: March 31, 1977.

ACADIA UNIVERSITY

Computer Science Department

Applications are invited for a faculty position in the Department of Computer Science at Acadia University. The duties are teaching courses at the undergraduate and graduate levels in Computer Science together with a suitable research program. A Ph.D. in Computer Science or a related subject is required. The appointment will be at the rank of Assistant Professor or higher.

The salary is negotiable and fully competitive. The effective date of appointment is 1 June 1977, however the appointee may not be required to be present on campus until late summer, by arrangement with the Head of Department. Applications should be addressed to Dr. A.A. Mufti, Head of the Department of Computer Science, Acadia University, Wolfville, N.S. BOP 1X0.

Applications will continue to be received until the position has been filled.

Data Processing Professionals

THE FINANCIAL WORLD OF THE FUTURE IS TAKING SHAPE AT CHASE

There's a pioneering role for you, helping design state-of-the-art

Electronic Funds Transfer Systems.

LEAD ANALYSTS

COMMUNICATIONS/MESSAGE SWITCHING

For positions of highest technical challenge – with unlimited growth potential – candidates will need strong leadership skill to guide teams of applications programmers or systems designers through development of complex mini-computer based systems. Must have 5-8 years on-line/real-time systems experience. 3 years mini-computer and 2 years Fortran IV also essential.

SYSTEMS DESIGNERS

COMMUNICATIONS/MESSAGE SWITCHING

For positions putting intense demand on creativity. Will design, customize and implement specialized systems software – such as Executive and Control programs – for real-time mini-computer based systems. Requires 4-8 years on-line/real-time systems experience. At least 2 years experience in mini-computers, systems programming and Fortran IV also essential.

For the above positions, knowledge of real-time operating systems would be highly desirable . . . along with experience in PDP-11/70, RXS-11D, Macro-11, Fortran IV Plus, Electronic Funds Transfer Systems.

Among all major commerical banks, Chase has pioneered and leads in Electronic Funds Transfer Systems. Let's discuss the dimensions of your experience and match them against the dimensions of the career you can create for yourself here. Salaries, benefits, advancement opportunities are everything you'd expect from an organization of our stature. For immediate consideration, in assured confidence, forward your resume, including salary history and requirement to: **EDP Recruiting, 23rd Floor, Chase Manhattan Bank, One New York Plaza, New York, N.Y. 10015.** *We are an equal opportunity employer M/F.*

CHASE

FLORIDA

SYSTEMS ANALYSTS

Orange County Government. Permanent career positions. Analyze, Design, Implement and Maintain Systems, required by County Government.

Bachelor's Degree and two years' responsible E.O.P. experience and/or four-year Degree in Accounting with considerable responsible E.O.P. and auditing background, and/or high school graduate and four years' responsible E.O.P. experience. Burrough System/Cobol.

Send resume and salary requirements to Personnel Department, P.O. Box 1393, Orlando, Fla. 32802.
Equal Opportunity Employer M/F

IBM EXPERIENCE?

MAKE YOUR MOVE NOW!!

Urgent need by Fortune 500 clients for EOP personnel with 1 or more years' exp. Banking, insurance, manufacturing or distribution.

Systems Programmers $16-24K
20 prime areas including the Carolinas, GA, FLA, LA, Texas & Calif. Mich. PA.
OS Prog. Analysts $12-24K
Over 70 locations including San Francisco, Portland, Phoenix, Oellas, Jacksonville & Miami, Minneapolis, Oetroit, Richmond.
Data Base Specialists $20-30K
Your choice of locations. Excellent positions available throughout the U.S.

. . . OVERSEAS . . .

Systems Programmers to $28K.
Mideast location

PARTIAL LIST ONLY

All fees & costs willingly paid by client companies. ALL CONTACTS CONFIDENTIAL! CALL NOW to our TOLL FREE NUMBER!

1(800) 821-2270 Ext. 605

(Missouri residents call: 1(800) 892-7655)

EDP DIVISION
JIM KING
438 Gulf Life Tower
Jacksonville, FL 32207

Ask for our new free booklet on effective resume preparation.

Faculty Position

Data Processing

Many leading technical minds have banded together to provide qualified deaf students with a post-secondary technical education. These professionals enjoy the support of the Rochester Institute of Technology in modern facilities and up-to-date learning environment.

This opportunity calls for an individual with a Degree in Computer Science or related field, 3 years experience in business or industry, with emphasis on COBOL. Master's Degree and teaching experience preferred, but not required. Programming project supervision background desired. The position requires knowledge of or willingness to learn Manual Communication.

You will teach introduction to O.P., COBOL, BAL, Systems Design and/or O.P. Project classes. Responsibilities also include curriculum development, academic advising, tutoring and planning.

Please send your resume or "C.V." in strict confidence to: Personnel Coordinator.

NATIONAL TECHNICAL INSTITUTE FOR THE DEAF
ROCHESTER INSTITUTE OF TECHNOLOGY
One Lomb Memorial Drive
Rochester, New-York 14623
An Equal Opportunity Employer

"IMS" APPLICATIONS

PROJECT MANAGERS to $25,000

Must have good manufacturing systems design experience. Will participate in the design of a Corporate Manufacturing Control System for this billion dollar corporation. On-Line and IMS experience can be gained.

SYSTEMS ANALYSTS to $24,000

Excellent opportunity to join this group developing an On-Line IMS Material Requirements Planning System. Must be able to set and meet implementation schedules. Travel approximately 25%. Upon completion will take over as manager of a divisional site.

PROGRAMMER ANALYSTS to $21,000

Use your previous experience in hard goods manufacturing industry as an entry into this progressive organization. Manufacturing experience with bill of material, shop scheduling, and inventory control. Good 370/COBOL experience required.

CHRISTOPHER & LONG
ESP Division
7777 Bonhomme/Suite 1801
St. Louis, Missouri 63105
(314) 862-9900

R.S.T.S.

Opportunity to work in colorful Colorado with experienced Basic Plus Applications group. Must have degree in accounting or finance and R.S.T.S. experience. Send resume and salary requirements to:

Michael M. Niernberg
EDI Computer Services
13693 East Iliff
Denver, Colo. 80232
(303) 758-4619

COMPUTER PROGRAMMER II

College degree plus three years experience in programming. Must know Cobol, Assembler or PL-1 languages. Excellent fringe benefits. $1045-1154 monthly, depending on experience. Mail resume to City of Amarillo, Personnel Department, P.O. Box 1971, Amarillo, TX 79186.

An Equal Opportunity Employer

CLINICAL SYSTEMS SPECIALIST

The Management Systems Department of a large multi-hospital complex requires a Patient Care/Clinical Systems Specialist. Good knowledge of system software, real time communication and data base is essential. Must have an academic or equivalent background in physical science, engineering or mathematics. Experience with mini-computers very helpful. Competitive salary offered with excellent fringe benefits. Send resume to CW Box 4953, 797 Washington St., Newton, Mass. 02160. *An Equal Opportunity Employer.*

Programmer

DECSYSTEM-10 SYSTEMS SPECIALIST

Santa Barbara, California

We are a large, growth-oriented company using a Decsystem-10 to meet our ever-growing needs for information. We are looking for people with meaningful, large scale Decsystem experience in commercial data processing environment

- **SYSTEMS CONSULTANT** - Monitor system performance, analyze system data, define bottlenecks and tune system Recommend design techniques for COBOL application and operating systems software which will increase system efficiency, consult on system expansion Requires 5 or more years experience, at least 2 of which must have been as a Sr. Systems Programmer on a Decsystem-10 in a commercial D.P. environment
- **SYSTEMS PROGRAMMER** - Test and install new operating systems, network, support utilities and language processor software releases Install fixes to system software, analyze crashes Requires 3 - 5 years experience, at least 1 of which must have been as a Systems Programmer on a Decsystem-10 in a commercial D P environment
- **USER CONSULTANT** - Advise the operations and applications staffs on proper use of the Decsystem-1080 Prepare and conduct seminars on system use Requires 2 - 3 years programming experience using COBOL and FORTRAN on a Decsystem-10 in a commercial D P environment

These positions represent an unbeatable career opportunity with one of the fastest growing and most soundly managed companies in the restaurant industry Sambos Restaurants, Inc., an NYSE listed company operates over 725 family style restaurants, nationwide Our headquarters are located in Santa Barbara, a small beach city, approximately 100 miles up the coast from Los Angeles It is regarded as one of the most desirable living areas in the United States Relocation assistance will be provided

Please submit resumes, including salary history, to the attention of **Ms. Heidi Winburn.**

Sambo's RESTAURANTS®

SAMBOS RESTAURANTS, INC.
P.O. Box 536
Carpenteria, CA 93013

Come Grow With Us!
An Equal Opportunity Employer

Senior Software Analyst

Major company in Northwestern Pennsylvania wants an outstanding Senior Software Analyst to join its MIS staff.

Candidate must have OS/VS1 experience in generating an operating system, three years systems programming in OS shop.

Outstanding opportunity for growth, excellent compensation package, desirable location.

Send background and salary to:

CW Box 4951
797 Washington Street
Newton, Mass. 02160

PROGRAMMERS

We have positions in Boise, Idaho, for programming personnal to participate in multiple systems development projects. These positions provide an opportunity to become a part of a progressive systems development staff. Qualifications should include experience with PL/1 or COBOL, RPG II, IBM System/370, DOS/VS, DL/1 and VSAM. College degree is desirable.

Programmer/Analyst - 3 to 5 years PL/1 or COBOL programming.

Programmer - 2 years PL/1 or COBOL programming.

Send resume and salary requirements to:
Mr. John C. Dominick
IDAHO POWER COMPANY
1220 Idaho Street
Boise, Idaho 83721
(208) 345-7210, Ext. 278
An Equal Opportunity Employer

ANALYSTS/PROGRAMMERS

Opportunities exist in Indianapolis, Columbus and Chicago for seasoned analysts/programmers to further their career. Position provides for exposure to multi-hardware and multi-software environments for the purposes of evaluating and testing computer systems. Formal training programs, excellent fringe benefits and opportunity to expand your background.

Candidates should possess:

* strong oral and written communication skills
* minimum 5 yrs. industry experience
* programming competancy in COBOL and one other language
* degree preferred

For immediate consideration, send resume stating salary history and location desired. Replies will be handled in confidence.

CW Box 4954, 797 Washington St., Newton, Mass. 02160
An Equal Opportunity Employer M/F

---

halbrecht

Our 20th year, the first recruiting specialist in data processing and the management sciences. In addition to those listed below, we have many other professional positions available both locally and nationally $15-$50,000. All positions fee paid by our clients.

EDP CAREER OPPORTUNITIES

DIRECTOR, MIS $28,000-$32,000

Client is a leading manufacturer in its field. They seek an EDP professional to head-up an 80 million-dollar division located in the suburbs of Eastern Pennsylvania, which has designated its lead division for all systems development activities. Ennvironment is an RJE interface with Corporate Computer Centers and a staff of 6-10 systems and programming professionals. Excellent relocation policy. Degree necessary. MBA is a plus. REFER TO POSITION #1

BUSINESS SYSTEMS ANALYST $20,000-$25,000

Client is a Fortune 100 customer products company located in the suburbs of New York City. They seek an individual who can interface with upper-level management to develop and implement business systems within the financial and manufacturing areas. High visibility and good growth potential with this company. Degree necessary. MBA is a plus. REFER TO POSITION #2

PROGRAMMER ANALYST $18,000-$22,000

Client is a Fortune 100 manufacturing company located in Northern New Jersey. They seek an individual who will develop business systems applications for their Corporate Distribution department. Individual must be able to take a project from beginning to end, feasibility to implementation including the programming (OS/COBOL) aspects. Degree necessary. MBA +. REFER TO POSITION #3.

The following position is listed exclusively with our executive search division:

DIRECTOR, DOS/OS CONVERSION $35,000-$40,000

Client is a major multi-divisional manufacturing company located in the Mid-West. They seek an individual who will spend the next 1 to 2 years converting their many divisional system activities from DOS to OS. Individual must be promotable to become the Manager at one of their regional data centers after this assignment is completed.

Address correspondence for the above position to Mr. John Simon.

To respond to the above positions, refer to the appropriate job position number and send to the attention of Mr. Robert Watsman.

HALBRECHT & CO., INC. 281 East 42nd Street
New York, N.Y. 10017 (212) 882-3555

NO ALTERNATIVES?

We can help you out of a professional dead end. We're the NPA affiliates with success in our DP backgrounds. Our fees are employer paid.

Benefit from our experience. We'll put you on a one-way street to fulfillment.

RANDALL HOWARD & ASSOC., INC.
5350 Poplar Ave., Suite 412
Memphis, Tenn. 38117
(901) 767-5150

C.J. VINCENT ASSOC., INC.
Specialists - Sales/Marketing
2000 Century Plaza
Columbia, Md. 21044
(301) 997-8590

PETER A. KECHIK & ASSOC.
1420 Renaissance Dr., Suite 301
Park Ridge, Ill. 60068
(312) 298-1148

National Personnel Associates®

EDP SEARCH

EDP Auditor $14-18K
Degree and two years exper. position in N.Y. state.
Mini Analyst .... To $21M
Prefer Raytheon or Engrg. exper. Oklahoma.
Prog/Analyst .... To $15K
COBOL & BAL desired 2 yrs. Located in Alabama.
Tech Support .... To $25M
DS-CICS SYSGEN desired. Ala.
NCR-NEAT .... to $15M
Seek on-line exper. LA.
Sr. Programmer $19M
Math or Science degree & engrg. appl. Using PL-1-Ala.
NCR-NEAT .... to $18M
Prefer banking-Central & S. Texas
Programmer .... To $18M
Univac-COBOL-BAL-Arkansas
COC-Sysgen $20M
SYSGEN KRONOS-Oklahoma
COBOL $13M
DOS-OS IBM-Dallas, Tx.
ANALYST $18M
Degree-Business Apps. Dallas
BANKING $14-20M
Trust-DDA-or General-Houston, Dallas, El Paso, New Orleans, Birmingham, Jacksonville, Wichita, Ks.
SEISMIC .... To $24M
All types - Okla., Tex, Colo.
OPRNS MGR $18M
Seek Burroughs 3500-larger or Honeywell 6000-Okla.

EDP SEARCH 2401 NW 39th
Okla. City, OK 73112
(405) 525-8833

CONNECTICUT

New Haven Area (Exclusive)

Sr. Programmer/Analysts

Train
ON-LINE IMS

Large scale state of the art 370/158, 168 environment. Our client has asked us to locate a number of experienced COBOL/OS Programmer/Analysts. Any applications experience is acceptable. You will work on development teams in on-line applications.

Extensive education programs available. Paid relocation. Our client is an equal opportunity employer. Salaries to $23,000. Call or write in confidence, Toby S. Brimberg.

3074 Whitney Ave
Hamden Ct 06518
(203) 288 7461

BREEN DATA
Division of the Breen Group Inc

RAYTHEON DATA SYSTEMS HAS MORE OPPORTUNITIES FOR ENGINEERS

Our Engineering Staff requirements continue to grow rapidly in these areas:

SENIOR PERIPHERAL ENGINEER

. . . to develop and implement peripheral equipment subsystems for terminal, minicomputer and distributed processing applications, as well as specifications, test plans and procedures, and laboratory testing of new designs.

This position requires a BS in EE plus 3-5 years experience in magnetic recording, magnetic media device electronics (disc tape, cassette, diskette, etc.) and error detection and correction techniques. A background in vendor interface, liaison and technical control is essential. Logic design, microprocessor application and software experience would be helpful.

SENIOR ENGINEER-- SOFTWARE SYSTEMS

. . . to take charge of our new nearly complete FORTRAN compiler and run-time work and be responsible for field testing and all maintenance. Also to assume responsibility for general FORTRAN compiler development, run-time work and maintenance for the RDS-500 minicomputer. The new compiler is largely FORTRAN and cascades into an existing assembler. Thus, the successful candidate must learn the machine language and the operating system.

This position requires 3 years programming experience including FORTRAN compiler experience and a BS or equivalent.

DATA BASE DESIGN ENGINEER

. . . to be responsible for data base development for distributed processing minicomputer systems such as the PTS/1200.

This position requires a BS (MS preferred) plus at least 5 years experience with minicomputer implementation of high level data base management techniques. Familiarity with a variety of file structures is essential.

SECTION MANAGER --SOFTWARE SYSTEMS DESIGN

. . . to assume responsibility for the design and development of system and communication software for our PTS/1200 distributed processing system.

This position requires you to be experienced with IBM 3270, 3780, 360/20 and operating systems with at least 5 years innovative design and development experience. A BS is required.

If you have the qualifications and are interested in moving upward with a growth-oriented organization, send your resume plus salary history to Arthur J. McMahon, Manager Professional Employment and Compensation, Raytheon Data Systems, 1415 Boston-Providence Turnpike, Norwood, MA 02062.

RAYTHEON

RAYTHEON DATA SYSTEMS COMPANY

An Equal Opportunity Employer M/F

SYSTEM ANALYST

New Eng. Corp. has need for indiv's with broad exp in designing General Business Systems, preferably in an IBM environment. Potential for systems mgr. Salary to $19,000 (Fee paid) Contact Stan Durbas.

ROBERT HALF
PERSONNEL AGENCIES
111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170

SENIOR PROGRAMMER/ ANALYST

BANKING AND BURROUGHS EXPERIENCE

Immediate opening for individual with minimum 3 years experiance in banking applications and COBOL, B3500/4700, IPS, NDL, assembler experiance desirable. Send resume and salary requirements to:

BARCLAYS BANK OF
CALIFORNIA
P.O. Box 5340
San Jose, CA 95150
or call: (408) 244-3500 ext. 42
Affirmative Action Employer M/F

STATISTICAL PROGRAMMER

Two Openings

Requirements are a B.S, degree in computer science or mathematics and one or more years experience as a programmer. Send resume to:

Dr. Fred Davis, Dir.
Div. of Numerical Services
Mississippi State University
P.O. Drawer CC
Mississippi State, MS 39762
MSU is an Affirmative Action
Equal Opportunity Employer

EDP SYSTEMS PROGRAMMER

Salary $15-182–$19,959

3 years digital computer programming/computer operations analysis experience, including 1 yr. experience in systems programming. MUST HAVE IBM OS/VS EXPERIENCE. Other anticipated vacancies.

ARIZONA STATE
PERSONNEL DIV.
1831 W. Jefferson
Phoenix, Ariz. 85007

Opening

Position - Director of Management Information Services (MIS) - Region IV.

Function - to manage the Southwest and West Central Educational Cooperative Service Unit (ECSU) MIS organization, to plan system development and coordinate with State Department of Education.

Education - Degree in Administration/Management in Education/Business, Computer Science or related field.

Experience - experience in computer based MIS and/or as a user in an educational agency.

Deadline - April 15, 1977.

Starting Date - July 1, 1977.

Salary - $20,000 - 24,000

Apply to - Glen Shaw, Regional Director, SW & WC ECSU, Southwest State University, Marshall, MN 56258, phone (507) 537-7141.

PROGRAMMERS/ ANALYSTS

Your talents in systems are needed by our young growing organization. We have interesting and varied ground floor opportunities available in Chicago and Atlanta for programmers, programmer analysts and project leaders. Basic requirements in Chicago are two + years experience in programming/analysis, using Cobol and BAL primarily in IBM and Univac environments. Of particular interest in Atlanta is experience with Burroughs B700 systems utilizing Cobol. You will have the opportunity to utilize your full capabilities as well as grow in an ever changing environment within this dynamic firm. Salaries flexible. Call or send resume to Pete Whittaker for confidential consideration. NORRELL SYSTEMS SERVICES, 3092 Piedmont Rd., N.E., Atlanta, GA 30305. (404) 262-2100.

Pick your spot in Advanced Systems Development at Data General

Find out today how your personal and professional goals stack up next to the new, once-in-a-career opportunities in Data General's expanding Advanced Systems Development Group.

Talk directly with technical staff members about the long and short term projects now underway, utilizing high-speed logic, Soft Architectures, Multiprocessing Systems, Advanced Security Mechanisms and related state-of-the-art techniques.

Discover the benefits of working with a young, informal organization that redefined the industry with the NOVA®, ECLIPSE® and microNOVA computer systems, while growing to more than $160 million in annual sales in less than nine years.

Check the chart. Choose the position that matches your qualifications best, then call or write for more information, or to arrange for an interview within the next few weeks at a city near you.

	Understanding of Advanced Computer Architectures	Minicomputer Industry Experience	Large Mainframe Development Experience	Operating Systems & Compiler	"Hands-On" Microprogramming Experience	ECL Design Experience	Familiarity with I/O Systems Design	Familiarity with Advanced Security Mechanisms	Power & Signal Distributional Experience	Technical Degree	Advanced Technical Degree	Minimum 2 Years' Experience	Minimum 4 Years' Experience	Minimum 6 Years' Experience	Motivated & Eager to Move in an Exciting, Fast-moving Environment.
Manager, Systems Design	●		●	●			●	●			●			●	●
Manager, ECLIPSE Systems Design	●	●		●			●							●	●
Manager, Firmware Systems	●			●	●					●					●
Manager, Systems Maintainability			●	●			●	●		●			●		●
Senior Logic Designers			●			●	●			●			●		●
Logic Designers		●					●			●					●
Senior Electrical Engineers			●			●			●	●				●	●
Microprogrammers		●		●	●					●			●		●

Call Today for a Technical Interview

Technical Staff members will be available all this week March 20 to 25 to discuss these opportunities in detail. Call (617) 481-5160 collect TODAY thru FRIDAY from 5 PM to 9PM (EST) for an immediate discussion or to arrange for an interview in any one of the 12 major metropolitan areas we will be visiting in the next few weeks.

If you prefer, you may mail your resume or a detailed letter to D. C. Turner, Professional Staffing, Data General Corporation, 16 Turnpike Road, Westboro, MA 01772. An equal opportunity employer.

Data General

SENIOR
SYSTEMS PROGRAMMER

We have an immediate opening at our San Fernando Valley computer center for a senior systems programmer who enjoys taking on diversified assignments and believes that professional growth comes from nonstop technical challenges.

Our systems staff plays a key role in developing and enhancing "leading edge" systems for timesharing, RJE, batch, and DBMS applications in business, finance, engineering, government, and the professions.

We're looking for a creative, self-motivated professional with at least 3 years' recent systems programming experience with 360s or 370s, Model 65 or up. Must have strong experience with O/S MVT, ALC, HASP, text-editing, 3705, BTAM or VTAM, TSO, and online systems.

Also desirable: a degree in computer science; PL/1 as a second language; experience with DBMS, SVS, MVS, CICS, and computer measurement evaluation.

If you're interested, please send us your resume. Or call Manager of Systems Programming at:

Proprietary Computer Systems, Inc.
16625 Saticoy St.
Van Nuys, Calif. 91406
(213) 781-8221
Equal Opportunity Employer M/F

PCS

LOUIS BERGER INTERNATIONAL INC. a U.S. company with world-wide activities in Engineering, Planning and Economic Development offers career opportunities for experienced:

HIGHWAY ENGINEERS

for assignments in French-speaking Africa.
also

Transportation Economists
Development Economists
Computer Systems Programmer-Analyst (IMS COBOL)

for assignments in the U.S. and world-wide.

We offer:
Competitive salary, overseas cost of living allowance, family travel, group life and health insurance. Please write and send resume with full personal and career details plus foreign language capability to:

Walter T. Oerlemans
Personnel Manager
LOUIS BERGER INTERNATIONAL, INC.

100 Halsted Street
East Orange, New Jersey 07019, U.S.A.
An Equal Opportunity Employer

TECHNICAL SUPPORT HIS 6000 SERIES

We require experienced Software Analysts to provide technical support to our Honeywell 6040 computer installation.

Duties will include the maintenance, documentation and trouble-shooting of GCOS and utilities, helping users with development and operating problems, and assisting with specific projects requiring specialized technical support. Other activity areas include job accounting, planning of hardware/software requirements, and maintenance of internal and external program libraries.

Desired qualifications include a minimum of 2 years experience with the HIS 6000 series, with special emphasis on GCOS and TSS, GMAP and Fortran. Some experience with GRTS would be advantageous.

Please apply in writing, giving full particulars of professional training, education, employment and salary history, quoting file number A827, to:

Employee Relations Department PanCanadian Petroleum Limited
One Palliser Square P O Box 2850 Calgary Alberta T2P 2S5

PanCanadian Petroleum Limited

DATA PROCESSING PROFESSIONALS

Conversion to IBM 370/148 OS/VS has set the stage for exciting career challenges in business applications. . .

. . . play an important part in this massive updating of our operational capability! We're Burger King, a wholly owned subsidiary of Pillsbury and a growing leader in the fast food industry.

DATA BASE MANAGER

Assume responsibility for the creation, organization, security and overall efficiency of data bases throughout the company. Previous experience in data base design and implementation plus a degree in business or related field required. Masters preferred. 6-8 years progressive DP experience that includes recent experience in IMS, IDMS, or TOTAL is essential.

SYSTEMS ANALYST

Responsibilities will center on translation of user needs into system applications. Business degree or related discipline is mandatory, MBA preferred. 3-5 years experience in systems analysis and a thorough understanding of general business principles are essential.

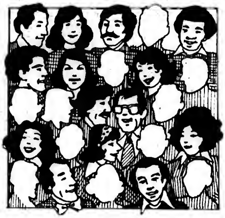
We offer an excellent salary range commensurate with experience and technical expertise, complete benefits and outstanding opportunities for career advancement and recognition. Send a letter or resume in confidence including salary history to: Mr. B. Brodie.

BURGER KING

BURGER KING CORPORATION
PO Box 520783
Biscayne Annex
Miami, Florida 33152

An Equal Opportunity Employer M/F

Fourteen of our top twenty-five Sales Engineers never sold computers before they came to Data General.



They were Software Support Engineers, Customer Engineers, Systems Programmers, Hardware Designers...you name it.

The point is this: You can stick to your job for the next 18 months, or become a Sales Engineer at Data General, sell computers for a year—and you'll make the same money. Or more. You already have the technical credentials and, if you enjoy dealing with people and working in a competitive environment, there's no limit to what you can earn as a Sales Engineer at Data General.

We give you more of what you need to be successful: computers, peripherals, technology, reputation, position—over 25,000 Data General computers have been sold and installed in 33 countries around the world. Stay where you are, or move up to Data General—it's your future.

Computer Sales Engineers

We require solid technical background in mainframes, minis or systems—plus the ability to open up new OEM and end user accounts is a must.

New positions are available in the following locations: Albuquerque, Baltimore, Birmingham, Boston, Chicago, Dallas, Denver, Huntsville, Knoxville, Little Rock, Los Angeles, Manhattan, Miami, Mobile, New Haven, New Orleans, Norfolk, North Jersey, Orlando, Philadelphia area, Phoenix, Portland, Richmond, St. Louis, Salt Lake City, San Diego, San Francisco Bay area, Seattle and Washington, D.C.

We need Systems Engineers in these areas as well.

To apply for a position call Jim Masciarelli collect at (617) 485-9201, and send your resume to him at Data General Corp., 15 Turnpike Rd., Westboro, MA 01581.

Data General

An equal opportunity employer M/F

V 112 MAR 21 77 UMI

Just Out! The New

Call for your FREE copy today!

Source Edp's *1977 Computer Salary Survey* is now available. This authoritative and up-to-the-minute report will allow you to compare your compensation directly with professionals across the country performing the same duties you perform. It also examines in detail the strategies and techniques thousands of successful computer professionals have used to enhance their careers. After fifteen years of recruiting experience, Source Edp knows how you can gain broader professional exposure, maximize your compensation and break into management. It's all in Source Edp's *1977 Computer Salary Survey* and career planning guide.

For your FREE copy, call the Source Edp office nearest you.

East		**South/Southwest**	
Boston	617/237-3120	Atlanta	404/325-6370
Greenwich	203/669-5977	Dallas	214/367-1600
New York/ New Jersey	201/687-6700	Denver	303/773-3700
Philadelphia	215/665-1717	Fort Worth	617/336-9300
Washington, D.C.	703/790-5610	Houston	713/626-6705
		New Orleans	504/561-6000
Midwest		**West Coast**	
Chicago	312/762-0657	Irvine, Ca.	714/833-1730
Oak Brook, Ill.	312/986-0422	Los Angeles	213/366-5500
Cleveland	216/771-2070	Palo Alto	415/326-7155
Detroit	313/352-6520	San Francisco	415/434-2410
Kansas City, Mo.	616/474-3393	Torrence, Ca.	213/540-7500
Minneapolis	612/544-3600		
St. Louis	314/862-3600		

source edp

(When writing, please be sure to indicate home, address and current position title.)

If unable to call, write:
Source Edp
Department C-10
721 Enterprise
Oak Brook, Illinois 60521

CONNECTICUT

Join this multi-national industrial staffing enlarged EDP Dept. Need many "action oriented" professionals. Large scale applications. Relocation & fee paid.

- Systems Project Mgrs $19-25,000
- Programmers & Analysts $14-19,000
- Mini-computer Pros $14-18,000

Send resume (state salary) to: Andre Malek

ROBERT HALF
PERSONNEL AGENCIES
111 Prospect Street
Stamford, Conn. 06904
(203) 325-4159

Banking

Data Processing

If you are interested in relocating to the beautiful Pacific Northwest, we currently have several excellent positions for EDP professionals with banking systems or programming experience. Send resume in confidence to Jim Morris, Hauser, Martin, Morris & Associates, 1621 114th S.E., Suite 219, Bellevue, WA. 98004.

PROGRAMMER/ANALYST

Reno Area

Would you like to live in an area that offers clean air, bountiful recreation and a good environment to raise children: Immediate opportunity for self-starter to work on IBM 370 and Burroughs B4700 systems.

Requirements include:

* 3 to 5 years Analysis and Design experience
* Heavy COBOL background a must
* IBM assembler a plus
* IBM DOS/VS and/or OS/VS1 knowledge desirable

We offer a competitive salary commensurate with experience. If you meet the qualifications please send your resume and salary history to:

CW Box 4952
797 Washington St.
Newton, Mass. 02160

Systems Programmers

OS Backgrounds

The proposed conversion of R.J. Reynolds industries large-scale computer operations from DOS/VS to OS/MVS offers excellent growth opportunities to Systems Programmers who aim at expanding their abilities in a high-challenge environment. In addition to being involved in our mode of operation from the inception, those qualified will find several added reasons to consider joining RJR.

- One is diversity. This Fortune 100 corporation is heavily involved in many growth industries, including foods, tobacco, metals, transportation, packaging and petroleum.
- Another is our commitment to maximizing the ways our computer facilities are utilized. This means multiple applications ranging from marketing to financial to process, materials and inventory control, to name but a few.
- The value we place on EDP skill is demonstrated by the salary structure in this area, plus the excellent benefits package, plus our rapid relocation. And our headquarters is in one of the most attractive living areas of the East Coast.

To qualify you should have two or more years experience, preferably in OS VS2MVS, TSO and JES II. We will also consider experience in OS MVT, VS1 or VS2 SVS. A degree or comparable experience is desired.

Write in confidence, including resume and salary requirements, to: Mr. Denis G. Simon, Manager of Employment, R.J. Reynolds Industries, Inc., 401 North Main St., Winston-Salem, N.C. 27102.

RJR
RJReynolds Industries Inc

Tobacco Products
Packaging
Foods & Beverages
Transportation
Oil & Gas
Aluminum

An Equal Opportunity Employer M/F

JOIN RAYTHEON SERVICE COMPANY AND GET THE BEST OF BOTH WORLDS.

First, you get growth potential because you'll be working with one of the fastest growing independent third party computer service company in the industry. Raytheon Service Company has built a successful reputation for responsive, responsible total system service over the last fifteen years and we're still growing.

Second, you'll be supported by a worldwide, multi-million dollar, organization with more than 50,000 employees. This means the best training, documentation equipment and parts inventory you'll find in any service operation — anywhere. Furthermore, you get the liberal benefits you'd expect of a FORTUNE 500 firm plus the challenge and opportunities of a successful smaller company.

Sound like a great opportunity? It is. So if you're interested, look into positions which currently exist in the following Raytheon Service Company locations:

Chicago
Dallas
Detroit
Minneapolis
New York
St. Louis
San Francisco Bay Area
Washington, D.C.

If you think you qualify, send your resume and salary history to David Murray, Raytheon Service Company, 2 Wayside Road, P.O. Box 503, Burlington, MA 01803. Or call 617-272-9300, ext. 302.

CUSTOMER ENGINEERING OPENINGS

SENIOR CUSTOMER ENGINEER

to handle the most complex installation, repair and maintenance tasks on a full-range of major customer equipment. This senior position carries a diversity of responsibilities for major accounts and includes responsibility for training other personnel and for functioning as regional technical support specialist.

CUSTOMER ENGINEER

to install and service a variety of customer computer equipment. This includes preventative maintenance, troubleshooting, diagnostics and repair, and possibly account responsibility.

ASSOCIATE CUSTOMER ENGINEER

to service a range of computer equipment: troubleshoot and diagnose common equipment problems and make repairs — under the direction of senior service personnel.

CUSTOMER ENGINEER TRAINEE

an entry level position in customer service — to learn, under direct supervision, the troubleshooting, repair and maintenance of customer computer equipment.

These positions include experience with IBM 360/370 systems with compatible memories; IBM plug-compatible peripherals; Honeywell 200, 2000, and 3200 systems and related peripherals.

NATIONAL TECHNICAL SUPPORT SPECIALIST

to assist in the development of business plans and equipment take-over . . . to analyze machine failures . . . to coordinate support efforts . . . and to carry on on-going review of field service staff and support requirements. Eight to ten years experience required.

REGIONAL FIELD SALES REPRESENTATIVES

to pursue computer service sales activities in assigned territories. Compensation includes an attractive base salary plus a progressive commission plan. Candidates should have related direct sales experience.

RAYTHEON

RAYTHEON SERVICE COMPANY

An Equal Opportunity Employer M/F

ACADIA UNIVERSITY

Systems Analyst

Applications are invited for the position of Systems Analyst in the Computer Centre at Acadia University. Desired experience is in the area of administrative system analysis and support. Proficiency in COBOL will be an asset.

The qualifications required are a degree in Computer Science or its equivalent. Suitable candidates may also be requested to assist the Director of the Computer Centre in the administration of the Centre.

Acadia University,
Wolfville, Nova Scotia, Canada
BOP 1X0 Attn: L.G. Jaeger.

INFO. SYSTEMS FACULTY

Faculty position at assistant/associate professor level in growing Dept. of Information Systems begins Sept. 1, 1977. Extensive software background and qualifications to teach courses in assembler, data base design and operating systems and ability to contribute to development of a graduate program in Information Systems. PhD pref. but will consider Master's degree with exper. An Equal Opportunity/Affirmative Action employer. Send letter of application and a detailed resume by April 15 to:

Bruce M. Saulnier, Chairman
Dept. of Information Systems
Quinnipiac College
Hamden, CT 06518
(203) 288-5251, e214

EDP INSURANCE MGM'T NEWLY CREATED POSITIONS SCENIC MID SOUTH CITY

Mgr Advanced Systems $25M
Will have the latest IBM DS/VS With his staff of 9-10 specialists incl. data base Adm. successful candidate will have track record and fit into a dynamic opportunity.

Mgr Finance Systems $25M
Will revamp and/or implement New and highly informative Financial and Accounting Sys. A major system will be policy owner Data Base. Candidate must be strong in systems, finance, accounting-CPA-helps.

Mgr Claims Sys $25M
Will design and implement new claims data base and retrieval Sys for both processing and analysis.

Life or Health exper will be considered for these positions

Your Account Exec will be MR. JAY ALLEN. He has held positions of: Chief Exec Officer of a National Service Co., DP Mgr of both Insurance and banking, 20 years fast track in DP Field. He is only one of 1020 account exec with unparalleled exper in this field.

EDP SEARCH
2401 NW 39th Okla. City
Okla 73112 405-525-8833

COMPUTER PROFESSIONALS

INTERDATA is the name to know at

INTERFACE '77

in Atlanta March 28th–31st

We're INTERDATA, where expansion and growth continue to create a demand for the best minds in the industry. If you're interested in daily challenge, a stimulating working environment and recognition of your special abilities, INTERDATA is the name to know. Outstanding opportunities are available for talented professionals with experience in the following areas:

NETWORKS , DATA COMMUNICATIONS

We are seeking senior designers and project leaders eager to participate in designing tomorrow's decentralized minicomputer approach to problem-solving. Experience with ARPANET, DECNET, MAXNET, SNA, SDLC, HDLC, DDCMP, or ADCCP preferred.

SYSTEMS DESIGNERS & SYSTEMS PROGRAMMERS

INTERDATA, a name to know, wants to know your name. Introduce yourself to AL NASEEF at the INTERDATA Employment Hospitality Suite at the ATLANTA AMERICAN MOTOR HOTEL. Stop in any time.

Career-making positions are available on all levels in any of the following areas: Operating Systems; Utilities, Software Quality Assurance; Diagnostics; Languages; and Data Base Management Systems.

If you can't make it, send your resume including salary history in strictest confidence to: Bill Beattie at our New Development Facility in Tinton Falls.

INTERDATA®
A UNIT OF
PERKIN ELMER DATA SYSTEMS
106 Apple St., Tinton Falls, New Jersey 07724

INTERNAL CONSULTANT

Network Design
and
Data Transmission
Systems

$35.000 to $40.000

Exeter Associates
Executive Recruiters
680 Lafayette Road
Hampton, N.H. 03842
(603) 926-6712

COMPUTER SCIENCE

Director of Computer Center; anticipated staff position beginning as early as July 1, 1977. Center composed of IBM 1130, IBM System 32, and Time Sharing Terminal to a DEC system 10. Candidate will also be expected to teach two courses a semester. M.S. in Computer Languages and Software as related to Data Processing. Applicant should also be familiar with business system applications of Data Processing. Apply by April 22, 1977, to: Dr. August Freda, Chairman, Engineering & Computer Science Divisions, University of Pittsburgh at Bradford, Bradford, PA 16701. Affirmative Action/Equal Opportunity Employer.

DATA PROCESSING SALES

Data processing service bureau in Southern California needs experienced salesperson to start marketing dept. Excellent opportunity for the right person. Submit resume with salary history (a must) in complete confidence to R. Park – P.O. Box 1983, Santa Ana, Calif. 92702.

FACULTY POSITION

The Department of Mathematics and Computer Science at the University of Nebraska at Omaha has a permanent position open at the Assistant/Associate Professor level starting September, 1977. Responsibilities include undergraduate and graduate teaching, research participation and curriculum development toward a proposed Masters degree in Applied Computer Science. Applicants should have a doctorate, recent publications and expertise in any of the following areas: minicomputers, microprocessing, data base or teleprocessing. Any industrial experience an added plus. Salary and rank dependent on qualifications. Inquiries and current vita should be directed to:

Dr. Margaret P. Gessaman,
Chairperson
Department of Mathematics/
Computer Science
The University of Nebraska
at Omaha
Omaha, Neb. 68101
UNO is an Equal Opportunity/
Affirmative Action Employer

CYBER SYSTEMS PROGRAMMER

Dallas Location

Suntech, Inc., a newly formed, rapidly growing subsidiary of Sun Company, Inc., is seeking a person experienced in CDC operating systems internals.

Working with a CYBER 172, running NOS/VE, you will evaluate, generate, and when required modify CDC operating system and support software. You will participate in, and/or lead, hardware and software evaluation and other technical studies.

We offer attractive compensation, benefits, and working conditions.

To apply, send your resume, complete with salary history, to: Mr. Steven M. Church, Suntech, Inc., PO Box 2880, Dallas, Texas 75221.

SUN COMPANY, INC.

(Formerly Sun Oil Co.)
Equal Opportunity Employer

FLORIDA

MANAGER OF TECHNICAL ADMINISTRATION & PLANNING

This position reports directly to the Top Computer Executive and is responsible for: Five-Year Plan, Budgets, special projects, overall project management, coordination of problems; policy and procedure development, Personnel and Training coordination; and facilities management.

This is a large IBM installation which has a steady growth in a highly profitable company.

Requirements: Management experience; at least 5 years data processing experience; ability to coordinate people; must have bachelor's degree, masters degree would be a plus.

Please send resumes to:

CW Box 4954
797 Washington Street
Newton, Mass. 02160

MINICOMPUTER MAINTENANCE ENGINEERS

Field Service Engineers with at least 3 years experience maintaining DEC PDP-11 Family of Minicomputer CPU's and their peripherals. Should be a technical school graduate or have equivalent experience and training. Requires comprehensive knowledge of complex data acquisition systems, communications systems, etc. using PDP-11/40's, 11/45's, 11/34's, etc.

Candidates must have demonstrated ability to write simple machine language test routines, understand thoroughly internal structure and interflow of data within processors, and be knowledgeable in use of MAINDEC and DEC-X diagnostics. Familiarity with non-DEC peripherals is an asset.

The University of California's Los Alamos Scientific Laboratory offers excellent working conditions and fringe benefits. Located high in the mountains of Northern New Mexico, the living is uncrowded and casual; the environment is pollution-free; the climate is superb — cool summers and mild winters; and recreational opportunities abound.

Send resume and salary requirements in confidence to:

los alamos
SCIENTIFIC LABORATORY

R. Lynn Wilson, Recruiting Director
Division - 77-M
Los Alamos Scientific Laboratory
P.O. Box 1663
Los Alamos, New Mexico 87545

An Affirmative Action/Equal Opportunity Employer U.S. Citizenship Required

---

PROGRAMMER/ANALYST

Are you looking for a challenging place to work and an enjoyable place to live?

Polk County Information Systems in Bartow, Florida is expanding rapidly and needs Programmer/Analyst for a large 370-135 DOS/VS shop. Programmer/Analysts with ANS-COBOL and CICS preferred. These positions offer a wide range of applications for a governmental agency. Minimum salary: $14,144. Qualified applicants should write or call: Mrs. Fredericks, Personnel Office, P.O. Box 60, Bartow, Florida 33830; (813) 533-1161.

Equal Opportunity Employer M/F

BRANCH MARKETING MANAGERS

Compensation $35,000

A major multi-national corporation, manufacturing and marketing computer based systems, seeks several Branch Marketing Managers for major eastern cities. Candidates should have a proven background in managing & directing sales, systems and administrative functions.

A more than competitive bonus plan provides financial reward for over achievers. If you have demonstrated marketing expertise as a Branch Marketing Manager and seek the opportuntiy for rapid growth and promotion, send detailed resume in confidence to this equal opportunity employer.

CW Box 4937
797 Washington Street
Newton, Mass. 02160

An Equal Opportunity Employer M/F

TVA
43
YEARS OF PEOPLE IN PARTNERSHIP

ANALYST/PROGRAMMERS

The Tennessee Valley Authority is seeking several highly qualified analysts/programmers with experience in Data Base Management Systems (DBMS), On-Line Processing Applications, and program development for large computer systems.

TVA's computing facility consists of two IBM 370/165's with 6 megabytes of main storage supporting more than 100 time sharing terminals and 17 remote processors under OS/MVT, HASP, TSO, System 2000, and INTERCOMM, and substantial expansion is in progress.

Work involves any and all aspects of professional systems analysis and associated programming. The positions emphasize skills and interests in the following areas:

- *Systems analysis and programming for development projects*
- *Technical support of general-use application programs*
- *Data administration and control*
- *Tutoring and teaching formal classes on ADP techniques*

Applicants should have a bachelor's degree in mathematics, economics, computer science, or one of the scientific disciplines plus three to five years' experience in programming applications on an IBM system comparable to the one described above. Competence in programming COBOL is essential, and experience with FORTRAN is desirable.

Salary range $17,000 to $20,000 depending on qualifications and experience. Excellent fringe benefits. Vacancies are in Chattanooga, Tennessee.

TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee 37902
Telephone: 615-632-2296

An Equal Opportunity Employer

Send resume or call
Employment Branch CW-48, Room 232 MIB

SYSTEMS PROGRAMMER

Contact us if you are ready to accept increased responsibility and would like to perform your functions during normal working hours.

Transcon is expanding the systems programmer staff to support the increasingly complex operating systems, a growing TP network and a demanding operations environment.

Our current operating systems are OS/MFT, VS1 and VM. Our hardware consists of a 370/158, 3705 front end and a nationwide TP network of over 200 terminals.

The position requires a minimum of 2 years experience as a systems programmer plus the sysgen and installation of VS1 system.

We offer a competitive salary, profit sharing and an excellent life and health insurance plan. Position is available in the corporate offices in the LAX airport area.

Please send resume with salary history to:

TRANSCON LINES
COMPUTER SYSTEMS
P.O. Box 92220
Los Angeles, Calif. 90009
An Equal Opportunity Employer

Computer Professionals:

YOU'RE FREE TO GO WHERE YOU WANT.

Many of us dream about moving to some favored area of our country. Few of us actually do it because the problems seem insurmountable.

But not for computer professionals! Now you have the freedom to realize your dreams. That's what NCA is all about. Our major purpose is to make your relocation a simple matter. Through our network of offices we can find you the position you want wherever in America you want to live . . . and before you move. Furthermore, most employers pay relocation costs. All employers pay our fees.

Exercise your new found freedom. Contact the NCA office in your area.

National Computer Associates

CHICAGO
McCormick & Associates, Inc
300 North York Street
Elmhurst, Illinois 60126

DALLAS
Data Processing Careers, Inc
Suite 1100
Stemmons Tower West
Dallas, Texas 75207

DETROIT
Electronic Systems Personnel
1705 Fisher Building
Detroit, Michigan 48202

FLORIDA
Data Sciences Personnel, Inc
Suite 205, 15400 N W 7th Ave
Miami, Florida 33160

HARTFORD
Compass, Inc
900 Asylum Avenue
Hartford, Connecticut 06105

LOS ANGELES
Constellation Enterprises
Suite 900, 2250 Wilshire Blvd.
Los Angeles, California 90010

MINNEAPOLIS/ST. PAUL
Electronic Systems Personnel
601 Nicollet Mall, Suite 1110
Minneapolis, Minnesota 55402

NEW YORK
Datel Associates, Inc
405 Lexington Avenue
New York, New York 10017

NORTH CAROLINA
TechForce, Inc
1040 E. Wendover Ave
P O Box [illegible]
Greensboro, N. Carolina 27405

PHILADELPHIA
Systems Personnel
207 Fox Lane
Wallingford, Pa 19086

PITTSBURGH
Electronic Systems Personnel
100 Lawyers Building
428 Forbes Avenue
Pittsburgh, Pennsylvania 15219

SAN FRANCISCO
The Computer Resources Group Agency, Inc
303 Sacramento Street
San Francisco, California 94111

SYRACUSE
CFA Associates Personnel, Inc. (Agency)
2530 James Street
Syracuse, New York 13206

TULSA
Data Processing Careers, Inc
Suite 10, Park 21 Building
2020 East 21st Street
Tulsa, Oklahoma 74114

WASHINGTON, D.C.
ESP Systems Corporation
Suite 210
1211 Connecticut Avenue N. W.
Washington, D C 20036

Computer Personnel Firms interested in NCA Membership, write to: J. McNamara, 2900 W Grand Blvd., Detroit, Mich. 48202

SYSTEMS/ PROGRAMMING MANAGER

We are a large and progressive Financial Institution in one of the Mid-South's finest cities. Our D.P. Dept. is one of the most advanced in our industry and we are striving to continue our aggressive, leading-edge tradition by hiring top quality personnel. We are looking for someone with a Bachelor's Degree, experience with IBM 370/135 DOS/VS, CICS and Assembler knowledge, and at least two years of Management experience. The right person can become Manager of our D.P. Operation in two years or less. Salary will be commensurate with experience. All replies will be held in strictest confidence. Reply to CW Box 4953, 797 Washington St., Newton, Mass. 02160.

SYSTEMS PROGRAMMERS

Two staff positions and one supervisory position exist in an expanding technical support group. We are currently converting from OS to SVS and CICS to CICS/VS using two 370/158 computers. Skills required include three to four years experience in OS/VS internals, SYSGENS, telecommunications and performance monitoring.

Excellent salary, top benefits and growth potential with this energy leader. Send complete resume, including salary history to the Personnel Department.

AMERICAN NATURAL SERVICE COMPANY
One Woodward Avenue
Detroit, Michigan 48226

An Equal Opportunity Employer M/F

DIRECTOR OF COMPUTER SUPPORT SERVICES

Ohio University is seeking an experienced professional to direct the computer operations and systems programming functions of the university computer center. Our present equipment includes a 270/158-2 meg CPU with related tape-disk-and TP hardware-VM-OSVS-CICS.

Major responsibilities are to direct and supervise operations and operators, direct and supervise the sytsems programming staff, maintain efficient operating systems and provide technical support to other elements of the department.

Qualifications include a degree plus 5 years experience in computer operations supervision and systems programming and knowledge of operating systems and utilities.

Salary - $18,000 plus liberal employee benefits.

Alden Dalzell, Director Computer Services, Ohio University, Haning Hall, Athens, Ohio 45701 Deadline: 4/29/77 ***Equal Opportunity/Affirmative Action Employer***

PROGRAMMER/ ANALYST

Opportunity for highly talented individuals with minimum of three years in business oriented data processing. To qualify you should have broad experience in dealing with people and computer systems.

Desirable qualifications are:

- Systems analysis, design and implementation of financial systems.
- Programming with IBM SS/360, S/370 assembler language, or COBOL for IBM or Burroughs system.
- Systems and program documentation
- Mini-computer system.

This position has upward mobility into a number of areas, both technical and administrative. Salary $15,000-$20,000, depending on qualifications.

Please send resume to:

Dalbar Financial Services, Inc.
545 Madison Avenue
New York, N.Y. 10022
(212) 759-3860

EDP OPPORTUNITIES

DESIGN Analyst-fixed income bond data base design — $35K
STAFF Cnslnt-materials mgmt systems 50% travel — $30-35K
CNSLNT-mini mid-range computer business applications — $23-33K
SR. SYSTEMS Anal-corpaorate staff, Fortune Co. — $25-29K
PROJECT Mgr-PDP RSX 11-M worldwide communications — $26-28K
CICS Project Mgr-Fortune co — $25K
SOFTWARE Systems -Honeywell 6000 — $23-29K
SYSTEMS Prog Anal-E.F.T.S. — $23-27K
MGT Sci-Oper Resch-M.R.P. systems — $23-25K
PROJECT Anal-marketing systems mini experience — $23-25K
TCAM Anal-Fortune Co. — $23-25K
SOFTWARE Prog-BAL OS 2 yrs minimum exp — $21-23K
CICS Analysts-hands on programming, major conversion — $21-25K.
PROJECT Anal-banking applications — $21-23K

Bill Borrelli (212) 349-3610
Wm. Harris Assoc.
150 B'way, N.Y. 10038

SOFTWARE PROG

Tech. oriented pro required by client with growing data center. Must be experienced in O/S internals and SYSGENS. Will be proj. mgr. for small tech support staff. $20,000 (Fee paid) Contact P. Siegal

ROBERT HALF
PERSONNEL AGENCIES
1310 Liberty Bank Bldg
Buffalo, N.Y. 14202 M/F
(716) 842-0801

SYSTEMS ANALYST

DATA BASE! BAL!
VSAM! IBM 370!
DOS-VS! COBOL!

If these are more than just words — practical operating concepts with which you are familiar & have direct experience, we'd like to talk with you. We need an experienced (3-5 yrs.) systems analyst to plan, design and implement the data base & reporting systems for a growing Wisconsin-based casualty insuror. Insurance background preferred — but ability to interface with users at all levels is mandatory. True advancement opportunity, top salary & benefits to right person. Contact Personnel Director, (414) 458-9131 Ext. 226 or send resume to:

HERITAGE INSURANCE
2300 Kohler Memorial Dr.
Sheboygan, WI 52081
Equal Opportunity Employer

SYSTEMS DESIGNER I

The University of Georgia currently has a vacancy for a Systems Designer I. Applicants should be knowledgeable and skilled in the following: Business or Educational Administrative Data Processing; Interactive Applications; several programming and control languages; including COBOL, MARK IV, TSO, OS JCL; OS Concepts and Facilities; effective verbal and written communication. Also, IMS and other data base experience desirable. Degree desired, but not mandatory. Submit resume with salary history to: Manager, Personnel Department, Personnel Services Bldg., University of Georgia, Athens, GA. 30602. *An Equal Opportunity/Affirmative Action Employer.*

DUNHILL OF GREENSBORO, INC.

Sys. Engr., design, implement, Cobol, Assembler . . . 19K
Prog., bus. Appl, Cobol, 370, OS/VST . . . 16K
Prog., financial, ANS, Cobol, or Assem., 370 tel. proc . . . $18K
Prog, Anal., Neat 3, Cobol . . . $20K
Sys. Anal., design mfg sys., Cobol, DOS/VS . . . $22K

These are samples of our many openings in the Southeast. Relocation expenses and our fee are paid by the companies. Call or write Sandra Tucker at

DUNHILL OF GREENSBORO
P.O. Box 9189
Greensboro, N.C. 27408
(919) 275-0946

BUY SELL SWAP

FOR SALE
Full 1 Meg 370/145

4 Channel Plus Channel Word Buffer

$475,000
April 1977 Delivery
Outstanding performer of 3 on-line nets simultaneously
Dealers and Agents welcome

INGERSOLL

The Ingersoll Milling Machine Co.
Call George Hess
(815) 987-6121

DEC Hardware for Sale
New and Used

All Eligible for Std
DEC Maintenance-Guaranteed
All in Stock - Now !!
Partial Listing is:

PDP 11T35 New System
2 PDP8-E Systems Loaded
PDP 11/45-BW including KT11-C and H960-DH
PDP 11/40 96K Core, TM11-EA, 2nd TU10-EE H960-DA & Extras
A Few Misc. Items:
RP03-AS
DB11-A
DF10-A
RP10-C
New DEC Terminals; Etc.
Call Gordon
(614) 889-0810
Scherer's Mini
Computer Mart

Scherer's Mini Computer Mart

FOR SALE
OR LEASE

360/40 H
360/50 H

Corporate
Computers, Inc
115 Mason Street
Greenwich, Conn 06830.
(203) 661 1500

For Sale

370/135 GF
With These Features:

4660
4870
4972
6991
7944
7961
9637
4656
7982
3046
9303

9060
9101
3900
3906
2001
1421
4646
9314
9820
9190
9046
8906

Equipment has been under IBM maintenance

Available Aug. 1, 1977
Call Dick Eaton
CHARLES MACHINE WORKS, INC.
(406) 336-4404
P.O. Box 68
Perry, OK 73077

FOR SALE

UNIVAC 9200
8K
250 LPM Printer 96 PP
400 CPM Reader

Serial Punch
Private Owner
(314) 772-2822

FOR SALE
Delivery Position
IBM-370/138

July 22 or better delivery.
Will sell to highest bidder
by April 8 or first bidder
over $19,250
both subject to
acceptable terms.
Agents and Dealers welcome.

INGERSOLL

The
Ingersoll Milling Machine Company

Call George Hess · 815/987-6121

BURROUGH B1714

66KB Memory
4.6 MB Disk Cartridge
400 LPM Printer
96 Col Reader/Punch
3 Station Tape Cluster
2 Data Comm Controls
& Adapters

Contact: Gerry VandenBerg

ELSTON-RICHARDS
3738 Patterson S.E.
Grand Rapids, MI 49608
(616) 942-9541

FOR SALE
BURROUGHS B3500

120 KB Core Memory
800 lpm Line Printer
(2) 800 BPI-9-Tr Tapes
800 CPM Card Reader
20M Bytes Disk (20 ms)
Ernie Lucken
Diversified Computer
Applications
2525 E. Bayshore Road
Palo Alto, Calif. 94303
(415) 324-2523

FOR SALE

(5) 129-03's
BUY/SELL/LEASE/TRADE

024
026
029
046
047
066

069
077
092
093
084
066

099
129
402
403
407
614

619
626
649
652
567
902

1401's 1130's 360's

Contact: Gene Nicholl
Gemini Computer Corp.
8696 N. Stemmons Freeway
Dallas, TX 76247
214-630-8355

370/155 II

SALE OR LEASE
Available April
With or Without Memory
Call Ted Molinari

IPS
IPS Computer
Marketing Corp.
467 Sylvan Ave.
Englewood Cliffs,
N.J. 07632
(201) 871-4200

BUY – SELL – LEASE
– BROKERAGE –

[illegible]
[illegible]

Buy, sell, lease, sub-lease, or be your agent in placement of your pre-owned IBM 360/370/System 3, or other units

COMPUTER INTERNAT'L LTD
BEACH COMPUTER CORP
CWC's Leasing Division
COMPUTER WHOLESALE CORP
(504) 581-7741

Suite 507/508 First National
Bank of Commerce Bldg
New Orleans, LA 70112
Member Computer Dealers Assn.

SYSTEM/3-15's
FOR SALE

All of the following System/3, Model 15's are available for delivery within 60 days.

5415-A20
3277-001
5421-001
1403-002
5424-A02
5444-A02
5445-001
5445-003
3411-001

5415-A20
3277-001
1018-001
5444-A02
5444-A02
5424-A02
5421-001
1403-002
5445-003
3411-003
3410-003

5415-B19
3277-001
5421-001
1403-N01
3340-A02
3741-001

5415-C22
3277-001
5421-001
1403-N01
3340-A02
3340-B02
3411-003
(3) 3277-002

Modification to above configurations can be made.

Call: Jack Goodman
901-767-9130

ECONOMIC COMPUTER
SALES, INC.
1266 Lynnfield Rd.
Memphis, Tenn. 38117
Member CDA

---

dataserv

buy • sell • lease • trade

360	370	System/3	Peripherals
360/30	370/115	5410	Disks
360/40	370/125	5415	Tapes
360/50	370/135	Sys/32	Printers
360/65	370/145+	Peripherals	Card I/O

Call our "quotation hot-line"
Toll free **800/328-2406** / or 612/544-0335
Or write: Dataserv Equipment, Inc., 9901 Wayzata Blvd., P.O. Box 9488, Minneapolis MN 55440

DEC HARDWARE

Available Immediately

- PDP 11T35 system (includes 32K words; RK11 controller with 2 drives, LA36)
- MF11-US (additional 64K words)
- KE11-E (hardware multiply/divide)
- Additional (3rd) RK05 drive
- TMB11-EA 9 track, 800 BPI drive with controller
- H960-DH Cabinet

Also available with or without system.

- 2 TU10-EE slave mag tape drives
- 1 TJU 16-EA 9 track, 800/1600 BPI drive with controller

Items are on DEC maintenance and are 3 months old.

Call Mr. Grand
(212) 221-7266 (212) 221-7270
(No brokers, please)

WE WANT TO BUY

3830-2
3803-1
3420's

Call Ed Joseph

IPS
IPS Computer
Marketing Corp.
467 Sylvan Ave.
Englewood Cliffs,
N.J. 07632
(201) 871-4200

Before you buy or lease take a second look

TW

BUY-SELL-LEASE

360/30 — 360/40 — 360/50 — 360/65

IBM PERIPHERALS

~~370/135~~	~~370/145~~	~~370/155~~	~~370/165~~
370/138	370/148	370/158	370/168

ANY CONFIGURATION

TW COMPUTER INDUSTRIES INC.
3570 American Drive • Atlanta, Georgia 30366
404/451-1895 • TWX 810/757-3654

CHICAGO — 312/295-2030
WASHINGTON — 202/466-2470
LOS ANGELES — 213/370-4844

FOR SALE

IBM 5100 Portable Computer, Model A02, 32K, APL, with 5103 Printer and 15 Tapes.
(Private Owner) Contact:

R.A. Wagner
(419) 476-9469 after 6 pm
Or Write: *(EST)*
Toledo Maumee Raceway Inc.
5700 Telegraph Rd.
Toledo, Ohio 43612

A National Bank wants to purchase the following configuration:

- 1-IBM 370/145 model I 2 (512K) Features required: 3274-6983, 7855-8810, 1421
- 1-3215 Keyboard
- 1-3047 Power Unit
- 8-3330 Model 1 Disk Drives and controller
- 8-3420 Model 7 (Dual density Tape drives & controller

Please contact
Mr. A.L. Neder
V.P. of Operations
(913) 233-2691

SELL • BUY
TELETYPE

Models 32-33 New, Used
Telex • TWX/DDD
BRPE'S
NATIONAL
TELETYPEWRITER CORP.
207 Newtown Rd.
Plainview, N.Y. 11803
(516) 293-0444

WANTED

BURROUGHS 'L' Series
DEC & DATA GENERAL
Minis & Peripherals
NCR: 399 & 299

Boynton Business Systems
87 Route 206
Wallkill, N.Y. 12584
914-895-2007

FOR SALE

IBM 1416 PRINT TRAINS

for IBM 1403-N1 printers most types available $1200.00. reconditioned & guaranteed 30 days. Print Chains & Cartridges available for 1403-2 printers.

CONTACT: PHIL HENN
COMPU-ACT COMPANY
116 Fieldmere
Elmont, N.Y. 11003
(516) 354-7735

JAMES
COMPUTER CO.

BUY/SELL/LEASE/TRADE

024
026
029
046
047
058

059
077
082
083
084
085

088
129
402
403
407
514

519
528
548
552
557
802

1401's • 1130's • 360's
Your source for guaranteed equipment
James Computer Co.
4970 Marine Drive / Chicago, Illinois 60640
Natalie Reyes (312) 271-3311
(312) 728-6871

WANTED

ALL 360 AND 370 SYSTEMS
AND PERIPHERALS
WE BUY • SELL • LEASE • TRADE

transdata

Member Computer Dealers Association

P.O. Box 47762 Dallas, Texas 75247 PHONE (214) 631-5647

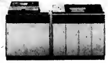
AMERICAN USED COMPUTER CORPORATION

ALL AN ASR 33 IS AND MORE!
NOW ONLY **$875**
OLIVETTI TE318
ONE DAY SHIPMENT
NATIONAL SERVICE
- 10 KEY NUMERIC PAD/RS232
- BUILT-IN PAPER TAPE/QUIET
- FRICTION OR SPROCKET FEED

GE635 (HONEYWELL). **164K**
THE DARTMOUTH TIME-SHARING SYSTEM
W/PRINTER, 6 TAPE DRIVES,
CARD EQUIPMENT
IBM 2314

IN STOCK NOW

FASTER THAN 1403N-1



AT 20% OF THE COST!
COMPLETE SYSTEM ONLY
$9500

A COMPLETE FACTORY REFURBISHED
DATAPRODUCTS OFF-LINE SYSTEM
1333 LPM PRINTER SYSTEM
- INCLUDES 7 OR 9 TRACK TAPE DRIVE
- NATIONAL SORBUS MAINTENANCE

617-261-1100
PO Box 68, Kenmore Station, Boston, MA 02215

BUY
SELL
LEASE
Peripherals & I/O

3330's 3410's 3211's
3340's 3420's 3505's
3350's 2401's 1403's
2314's 2501's

Gene Cheppell
CIS
CIS Corp.
600 Mony Pleza
Syrecuse NY 13202
(315) 425-1900
Telex: 93-7435

MINICOMPUTERS

Don't waste company monay. Check with us bafore you buy or sell.

DEC, DGC, Most Others' systams and paripherals.

DEC — CO$ 340/seva 25%. PDP 11/10 with floppy discs/save 25%. PDP 11, PDP 8, DEC peripharals.

DGC — NOVA 800 Timashare System/save 50%. Tapa systams/ from $3900. RJE Tarminals: Nova 2, Nova 3, Eclipse.

WANTEO

Minicomputar systems and paripharals . Buyers waiting for many items:
DEC RK 05
PDP 8E, 11/05

MINICOMPUTER EXCHANGE

(408) 733-4400
TWX 910-339-9272

---

145 H2 to I2
IBM MEMORY
Sale or Lease

Immediate Delivery

Call Rick Thiele

IPS
IPS Computer
Marketing Corp.
467 Sylvan Ave.
Englawood Cliffs,
N.J. 07632
(201) 871-4200

WANTED
DATA MODULES
3348-70

- Prefer IBM Brand
- Excellent Operating Condition
- Also Selling Reconditioned Modules

Please Contact Michael Baker
SYSTEMS SUPPLY CORP
100 E. Ohio St.
Chicago, IL
(312) 266-0100

BUY-SELL
TRADE

For Computer
Call Action Write
CAC
404/458-4425
P.O. Box 80572
Atlanta, Ga. 30366

SALE OR LEASE
IBM UNIT RECORD

024-$250	089-$1300
026-$800	402-$800
028-$1900	403-$900
046-$1200	407-$1200
047-$1500	514-$600
056-$175	519-$900
059$1800	526-$1400
077-$350	548-$1600
082-$850	552-$1000
083-$1850	557-$3000
084-$2300	802-$300
085-$1100	7330-$150
088-$2500	1401 system-$10 500

THOMAS COMPUTER CORP.
Suita 4202A
600 N McClurg Court
Chicago, IL 60611
(312) 944 1401

FOR SALE

INSTRONICS digitizer 36" X 48"
TKETROIX modal 4010-1 CRT
REMEX model 205 PTR
SUMMAGRAPHICS free curses digitizer 36" X 48"
TELETYPE model ASR-33
MOHAWK modal 6042 card reader

Equipment subject to prior sala. Most interfaced to HP-2100.

WANTED

Minicomputer and systems. Computer graphics aquipment. Peripharals.

Phillip A. Adams
K & M INDUSTRIES
5 Prancing Road
Chelmsford, MA 01824
(617) 256-2788

370/125's

For Sale* Lease* Purchase *Purchase Leaseback

Specialists in 125 Systems
CORPORATE COMPUTERS, INC.
(203) 661-1500
115 Mason St., Greenwich, CT 06830
Member CDA

WANTED TO BUY
145 MEMORY

Need prior to July 10, 1977

H to I (IBM 3345-2)
or
H2 to I2 (256K)
also
3046 or 3047

(Will consider rental credit machines)
Contact: Herry Blair
(713) 524-1401

SALE/LEASE

370/125
370/135
370/145
370/138
370/148
370/158
370/168
Delivery Positions
Opereting Leases

Talex
8420's
5403's
6318's

IBM
3330's
3420's
3340's

SYSTEMS MARKETING, INC.
200 East Thomas Road
Phoenix, Arizona 85012
(602) 264-5444 Telex 667-334

---

158 Computer Center Shutdown

Excess computer supplies and fixtures for sale.

Tapes, Tape Racks, Raised Floor, etc.

Call:
Installation Control
(415) 692-3960, Ext. 462

End User

wants to buy

DEC PDP 11/34
with 32K memory.

Contact:
Mr. Parr or Mr. Brown
(301) 247-0700

SUBLEASE
370/145 IH2

AVAILABLE: April, 1977
TERM: 36 Months - Consider Other
RATE: Best Offer Over $14,000/Month
FEATURES: 3/4 Meg (IBM), ISC, Plus More

Call Mr. Lunceford (913) 381-7272
L&A Computer Industries, Inc.
10955 Grenede Overlend Perk, Ks. 66211

FOR SALE OR TRADE
1 MEG
NATIONAL SEMICONDUCTOR
158 MEMORY
AVAILABLE NOW

FOR SALE OR LEASE
3158
JULY AVAILABILITY

TNCC
THOMAS NATIONWIDE COMPUTER CORPORATION

Brian M. Battle — (312) 944-1401
600 North McClurg Court · Suite 4202A
Chicago, Illinois 60611

Paul Nortmen — (516) 752-1000
1 Huntington Quadrengle · Suite 4S13
Huntington Station, New York 11746

370/168-L

AVAILABLE FOR SHORT TERM LEASE
CONTACT DAVE WYGODA
O.P.M. LEASING SERVICES, INC.

99 Wall St.
(212) 747-0672
New York, NY 10005
(800) 221-2674

360/65 CORE FOR SALE

AMS/ITEL 2 Megabytes
EM&M 1/2 & 1 Megabytes
IBM 2365-2's 2065 CPU Upgrades
Specialists in IBM Core. Trades & Leases Considered

CALL DICK BAKER (305) 561-5207

dataware incorporated
Intracoastal Building
3000 NE 30th Place, Suite 309
Fort Lauderdale, Florida 33306
Telephone (305) 561-5207
MEMBER CDA

GO GREYHOUND

WHEN BUYING OR SELLING COMPUTER EQUIPMENT

FOR SALE

Available Now
2-3330-1's
2803-2 & 2420-7's

Also Available
370/155J With
AMS Memory & PSU

U.S.	Home Office	T.A. Takash	(602) 248-6037
	New York	Dick Ventola	(914) 949-1515
	Chicago	Pete Ahern	(312) 298-3910
	Dallas	M.W. "Bill" Tucker	(214) 233-1818
	San Francisco	Henry Paulson	(415) 283-8980
International	Canada	Don Maunder (Toronto)	(416) 366-1513
	U.K.	Bruce Pearson (London)	(01) 759-9191
	Europe	Joe Gold (Geneva)	(022) 61-27-54
	Mexico	Andres Contreras	(905) 543-6850
	Austral Asia	Don Haworth	(214) 233-1818
Non IBM	Dallas	John Hallmark	(214) 233 1818

Greyhound Computer Corporation Greyhound Tower Phoenix, Arizona 85077

USER WANTS TO BUY

May-July Delivery
Position For
370/138 512K
with features

3621	4672	9425
3906	9080	9820
4655	9188	9903
4670	9314	9403

Reply with details of offer by 3/25/77 to:

CW Box 4952
797 Washington St.
Newton, Mass. 02180

WANTED

for DEC PDP-11/40
Used and in Good Cond.

- Disc Drives: RP02 or RP03
- Core: MF11US-64K Words/Parity
- Swap Discs: RS03 or RS04 RH11-Controller

Call User: Glen (312) 678-3450
5050 N. River
Schiller Park, IL 60176

PCM

**BUYING
SELLING
LEASING**

360/40	370/145	370/135
360/50	370/158	370/155
360/65	370/168	370/165

TAPES / DISKS / CORE

**Pioneer Computer Marketing
1165 Empire Central Place
Dallas, Texas 75247**
214/630-6700

AVAILABLE FOR LEASE

Any Term

3135 DH	3135-GF
April 1977	Sept. 1977

COMPUTER CAPITAL CORPORATION
1351 Washington Blvd. • Stamford, CT 06902
(203) 357-9663

BURROUGHS E-8000 COMPUTER FOR SALE

INCLUDES ALL COMPONENTS

$7,500.00

CALL:
CONSOLIDATED LEASING CORP.
(209) 466=2246
For More Information

360/40 G Disk System For Lease

High Speed IO Set
(4) 2314 Disk Drives
$2900
Term: 36 Months

SALE

IBM 360/30 128K CPU	$13,900
IBM 360/40 128K CPU Loaded	29,000
High Speed IO Set	61,500

(TERMS)
GENE JUMRALL
(713) 629-4400

COMMUNICATION TERMINALS

**with Data Entry
Key To Tape**

WAS ~~$9710.00~~

NOW ONLY **$3000.00**

These Communication and Data Entry Terminals will definitely solve your problems if you need a low cost system that is proven successful. Just give us a call or drop us a line, and we will be glad to forward all information.

Call (214) 361-6411
or write

Transamerica Computer Co., Inc.
One North Park East
Suite 333
Dallas, Texas 75231

A New Service For The Used Computer Marketplace

COMPUTER EQUIPMENT INFORMATION BUREAU

FOR BUYERS: CEIB is a free, up-to-date source on current used equipment offerings that's as close as your telephone. Our equipment file includes over 6080 current listings from numerous brokers, dealers, and private sellers. Just call (617) 247-2290 to obtain immediate information on any specific systems or items you're interested in — including seller's names, asking prices, and availability dates

FOR SELLERS: CEIB is an inexpensive, convenient approach to reaching potential buyers. If you haven't already received our brochure and listing forms, please write or call ···

CEIB – P.O. Box 163; Boston, MA 02117 – (617) 247-2290
R. Ferrere, President

FORSYTHE McARTHUR

IBM Computer Dealer & Lessor

919 North Michigan Avenue Chicago Illinois 60611
312-943-3770 Telex 255161
Member Computer Dealers Association

FOR SALE

Wang 2200-B
2230 Fixed/ Removable Disk Drive, Wang 2221 Printer 132 Column.

Wholesale beer, liquor and wine software is also available with this system.

Contact: Tom Lorden
1718 Northrock Ct.
Rockford, Illinois 61103
(815) 877-7456

SELLING

SELECT USED EQUIPMENT

FRIDEN • IBM • LITTON • PHILIPS • OLIVETTI
N.C.R 31, 32, & 41, 42, 43, 450's & 480's Bank Equip
735/736 MAGNETIC TAPE ENCODERS & LINE PRINTERS
299 and 399 Minicomputers and Centurys
BURROUGHS F-5000/6000/9000 SERIES & "L"2000 THRU 8000 SERIES & TC's (W/WO PERIPHERALS) also B-700 SYSTEMS THRU B-4700
N.C.R Authorized Dealer of
210 Electronic Cash Register Adding Machines Calculators
BUYING OR SELLING — CALL US FIRST!

KEY-EXIMPORT CORP.
256 LIVINGSTON ST. (P.O. BOX 129) NORTHVALE, N.J. 07647
TELE N.J. (201) 767 3444 N.Y.C. (212) 736 7736
TELEX 135149 CABLE KEYEXIMP NORTHVALE NJ

BUYING

End User

wants to buy

DEC PDP 11/34

with 32K memory.

Contact:
Mr. Parr or Mr. Brown
(301) 247-0700

SYSTEM/3

1130 360/20

BUY • SELL • LEASE

For a prompt, competitive quotation on your IBM needs, call or write today

"The Small Systems Specialists"

ECONOCOM
ECONOMIC COMPUTER SALES INC
1255 Lynnfield Road P.O. Box 17825
Memphis Tenn 38117 (901) 767 9130
TWX 810 591 1205
Member Computer Dealers Association

370/125 H2

S/N #10471
BUY AND SAVE
$100,000 or MORE
OR
LEASE FOR 36 MOS
AT 63% MAC

IPS

IPS Computer
Marketing Corp.
467 Sylvan Ave.
Englewood Cliffs,
N.J. 07632
(201) 871-4200

A Concept in search of a Definition

Computerworld presents a special report on Distributed Processing in the March 28th issue.

Computerworld's next special report will explore the wide open world of distributed data processing, starting with the hardest problem of all: defining what these buzz words mean. We'll have experts on hand to tell us, in their own words, just what constitutes a distributed processing system, and what does not. They might not agree, of course, but it should make enlightening reading for just about everyone.

Edited by Ron Frank, this special report will include a variety of information on distributed data processing. In all, it could help you make an informed decision on what some are calling the "wave of the future", and what others think of as three confusing words. So if you'd like to consider the benefits of a distributed system, or if you already have one, be sure you read the March 28th *Computerworld*.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

APPLIED COMPUTER SERVICES INC.

PROGRAMMING & SYSTEM DESIGN

- COMMUNICATIONS – MVS/TCAM, VTAM, 3705NCP
- UNIVAC - TIP/CMS/DMS, Data Base Design, Software Support
- IBM SERIES/1 - Real Time OS now being developed (3rd Qtr 77)
- SATELLITE - Command & Control, Real Time Sensor Processing
- FINANCIAL - Online Banking, General Ledger, Accts Payable

10911 Riverside Drive
N. Hollywood, CA 91602
(213) 980-1163

BUY • SELL • LEASE

370/125
370/115

ECONOCOM

ECONOMIC COMPUTER SALES, INC.
1255 Lynnfield Road PO Box 17525
Memphis, Tenn. 38117 (901)767-9130
TWX 510-591-1205

MEMBER COMPUTER DEALERS ASSOCIATION

CMI BUY LINES

370
115-125-135
Buy-Sell-Lease-Trade
Call Pam Hoban
(313) 774-9500

Systems
Components
Features
360/20
Call Bob Southwell
(313) 774-9500

S/3
Components & Systems
Call Jerry Roberts
(313) 774-9500

1130
Call Jim Carleton
(313) 774-9500

370/138-148-158
Delivery Position Information
Call Bill Graham
(313) 774-9500

360/65 360/50

360/40 360/30

We Buy and Sell Any 360 System or Peripherals. Before you buy or sell, get your most competitive offer from CMI.

Call Bob Van Hallemont
(313) 774-9500

3420's 3803's
3333's 3830's
3330's 3340's
SALE OR LEASE ALL MODELS
Call Darryl Hastings
(313) 774-9500

370/145-155-158
BUY-SELL-LEASE
Call Ron Baker
(313) 774-9500

IBM 129 Users
We Want to Buy Rental
Credit Machines
Lease Back
Plans Available

BUY-SELL-LEASE
129 029 059 026
IBM Manufactured
082 083 514
Call Jim Carleton
(313) 774-9500

IN CANADA
IBM 360 370
System/3
Buy-Sell-Lease
Call Don DuPuis
CMI Company
P.O. Box 893
Windsor, Ont. N9A6P2
(519) 258-8910

CMI Computer Marketers International
23000 Mack Ave., St. Clair Shores, Mi. 48080 313/774-9500
THE IBM DEALER

Member Computer Dealers' Association

---

dataserv

Dataserv Equipment, Inc
9901 Wayzata Blvd, P.O Box 9488
Minneapolis MN 55440

WANTED

370/148

370/148

Delivery Position

April-Sept. 77

Dave Miller

call toll free
800/328-2406
or 612/544-0335

FOR SALE
OR LEASE
IMMEDIATE
AVAILABILITY

370/135

FE 96K
1x4 1600 BPI
IBM Tapes & Control

Call or write
Roger J. Foti

IOA
I.O.A. Data Corp.
383 Lafayette St., N.Y. 10003
(212) 673-9300
Member Computer Dealers Assoc

---

dearborn

dearborn giveth: NOW 2050-I (3-chan.); 2319 (spindles only) B1 or B2.

dearborn giveth: SOON 155-J (1 meg) w/DAT; 3420-3; 3803-1 (dual) avail. 7/1/77; 135-HG avail. 10/1/77.

dearborn taketh away: 2314-1 DASD; 3270 displays; 2401 tapes.

Contact Tom Millunchick (312) 671-4410

dc **dearborn** computer leasing company | hardware 360s/370s systems software brokerage

4849 n. scott st., schiller park, IL 60176 chicago (312) 671-4410
toronto (416) 621-7060 • st louis • houston • detroit • los angeles

---

CONTACT CSI to BUY SELL LEASE TRADE Computer Equipment

Al Smith
8111 1960 West, Suite 202
Houston, Texas 77069
713-444-0246

Ken Steinbeck
11 S Meramec, Suite 1304
Clayton, Mo. 63105
314-727-7010

Bryan G Graham
8116 Charington Drive
Indianapolis Ind 46227
317-881-8766

Mike Jetland
23 Altarinda Drive, Suite B
Orinda, California 94563
415-254-3515

Bill Rosellus
901 Office Park Plaza
Oklahoma City, Okla. 73105
405-840-1911

CSI
COMPUTER SALES INTERNATIONAL, INC.
Member: Computer Dealers Association

DEC 10

COMPONENTS
FOR SALE

6 RP03 Disk Drives
2 RP 10S Disk Controllers
2 DF 10C Data Channels

Under Maintenance Contact

For Information Contact:
David Cartmell
First Church of Christ, Scientist
The Christian Science Center
Boston, Mass. 02115
(617) 262-2300 X3760

FOR SALE/LEASE

DEC
LA 36 DECwriters (New)
VT52 DECscopes (New)
LA180 DECwriters (New)
+ Many DEC type interfaces, controllers
RK05's, RP02's, RP03's
+ minicomputers, Peripherals, Systems Memories

WANTED
PDP8E's, PDP 11/05's, PDP 11/35's
Contact: Ted Reys or Frank Zimmer

UNITRONIX CORP.
1801 U.S. Hwy 22
P.O. Box 6515
Bridgewater, N.J. 08807
(201) 725-2560

BUY OR SELL

COMPUTER/COMMUNICATION EQUIPMENT

NEW IN-HOUSE
"DEAL COMPUTER"

- WE ACCEPT YOUR CONSIGNMENT INVENTORY
  —OR—
- WE WILL BUY YOUR INVENTORY OUTRIGHT
- WE MATCH BUYER & SELLER
- WE HANDLE THE TRANSACTION FOR YOU
  —AND—
- ALL LISTINGS ARE FREE!

GET COMPLETE DETAILS WITH A DIRECT CALL
800 527-3248 214 258-2414
TWX 910-860-5761 TELEX 73-0022

capital
equipment brokers
930 N. BELTLINE • IRVING, TEXAS 75061

PLEASE SELL US

- IBM 3830 Disk Ctl. and 3330 Drives
- IBM 3420 Tapes and 3803 Control

EARN MONEY FOR YOUR COMPANY IF:

- You're sending back IBM rented drives
- You're selling or subleasing owned drives

Thank you for calling or writing today

Member, Computer Dealers Assoc

Forsythe/McArthur Associates, Inc.
919 N. Michigan Ave., Chicago, IL 60611
(312) 943 3770 Telex 255161

For Sale

System 3/15 D21

May 1977 Delivery

Call Avery Reynolds 214-630-6700

PCM
Pioneer Computer Marketing
1165 Empire Central Place
Suite 232
Dallas, Texas 75247

Unit Record Deals!

All types - instant delivery. Reconditioned [illegible]
[illegible] certified for SORBUS or IBM M/A

Sell or Swap

Call Warner Rivera at (212) [illegible]

GENESIS ONE
[illegible]

300 East [illegible] Street
New York, N.Y. [illegible]

The Logical Choice

SELLING
LEASING
BUYING

360/40 128K Now
360/50 512K with 8080 May
360/65 512K May 15

370/165 4 Meg Speed-Up DAT
370/155 2 Meg 48 month lease
370/158 18 month lease

3350 3420-3 3420-5
3145 3155 3168

COMDISCO
9701 W. Higgins Rd Rosemont, Ill 60018
(312)698-3000
San Francisco (415) 944-1111
New Jersey (201) 568-9666

MINI COMPUTERS FOR SALE

D.E.C. CPU's
11/04, 11/05, 11/34, 11/45

D.E.C. Disks
RK05, RP03, RF11-RS11,
RX11BA

D.E.C. CRT'S
VT50HA, VT05, VT52

Printers,
D.E.C. LS11, Data Products 2410, Centronics 101, Data Printer V132C.

Call for other components in stock.

DATALEASE
(714) 533-3920
700 No. Valley St., A
Anaheim, CA
92801
Tlx. 692439
DATALEASE
ANH

GOING OUT OF BUSINESS SALE

—But we are still proud of our computer decision

A Complete Business System

- Developed exclusively for us by a reputable software house (with the thought of being sold to others).
- Flexible applications with wide use potential.
- Complete documentation available.
- No technical personnel required for system use.
- Less than two (2) years old with continuous maintenance on equipment — software thoroughly debugged.
- Only CRT input required.
- Hardware is a Singer System 10 model 4.
- Application packages included: sales order entry, invoicing, accounts receivable, inventory control & production analysis, sales analysis.
- Additional established Singer business applications available for installation cost only.
- Priced to sell at less than 100K.

For additional information write:
CW Box 4957
797 Washington Street
Newton, Mass. 02160

Q-PAC Payroll

Mightiest System of All

- Comprehensive tax module
- Customized personnel processing
- Most flexible report writer
- Powerful general ledger interface

Other financial systems
General Ledger
Accounts Payable
Accounts Receivable

SOFTWARE® INTERNATIONAL
Elm Square, Andover, Mass. 01810
(617) 475-5040
® Registered trademark of Software International Corporation

2314 - A1
1 × 9 With Two Channel Switch

Available Now

2401 - 5's
TAPE SUB-SYSTEM WITH CONTROLLER

Call Jeff Klein

IPS
IPS Computer Marketing Corp.
467 Sylvan Ave.
Englewood Cliffs, N.J. 07632
(201) 871-4200

WANTED

3420's 3803's
3333's 3830's
3330's

PCM will purchase your installed disk's or tapes that have maximum rental credits

214/630-6700

PCM
Pioneer Computer Marketing
1165 Empire Central Place
Dallas, Texas 75247

SALE

DEC RKD 3 & RKO 5 Drives Cntrl
DEC PDP 8M CPUs
DEC PDP 8E 8K Memory
DEC LA 30 Decwriter
Nova 2/10 32KW System
w 10 megabyte disk &
2 CRTs
Vadic 1200 baud modems

Boynton Business Systems
87 Route 208
Wallkill NY 12589
(914) 895-2007

FOR SALE

Communication Terminals

- Teletypes - 28 32 33 35
- TWX - TELEX
- DECwriters LA36
- Acoustic Couplers & Hardwire Modems

DATA COMMUNICATION EQUIPMENT BROKERS, INC.
4915 Fernlee
Royal Oak, Mich. 48073
(313) 549-3400

FOR LEASE-ANY TERM

IBM 370/145 I2
with
6982, 6983, 7855
8810, 3047 & 3215
Available April 15

Contact George Prussin
O.P.M. Leasing Services, Inc.
99 Wall Street
New York, New York 10005
(212) 747-0220
out of state call
(800) 221-2674

FOR SALE

BURROUGH'S

L-8300-200
Mini Computer
PF 26 26" Pin Feed
(3) A-9490-25 Cassette Tapes
A-4011 2KB Memory

IMMEDIATE AVAILABILITY
EXCELLENT CONDITION

Contact W.C. Linke
Nevada National Leasing Co., Inc.
4600 Kietzke Lane Suite 143
Reno, Nev. 702-825-2333

For Sale or Lease

SINGER COMPUTER SYSTEM 10

60K with 2 model 44 disk drives (40M ea.) 4-CRT, 450 LPM Printer with complete on line software system for furniture/appliance dealer. Call:

Retail Data Consultants
(305) 678-2288
Mr. Joo

MMS Accounts Receivable

Eliminates the Long Wait.

- Database Design — All Cobol
- Open Item or Balance Forward
- Multi company
- Flexible Aging
- Simplified Cash Posting

SOFTWARE® INTERNATIONAL
Elm Square, Andover, MA 01810
(617) 475-5040
® Registered trademark of Software International Corporation

BUY/SELL/LEASE/TRADE

IBM 360s, 370s, System 3s, all Peripherals
3830s, 3333s, 3330s, 3420s, 3803s

Purchase/Leaseback Machines Wanted
All types 1400 Series; 1130s, 1620s
Unit Record Equipment Refurbished — All Models
Disk Packs — recertified, initialized

Call collect today **(214) 634-2750**

METROPLEX COMPUTER COMPANY, INC.
Suite 1208 Honeywell Bldg. 1111 W. Mockingbird Lane
Dallas, Texas 75247 TWX 910-861-4171

FOR LEASE OR SALE

370/155-II

One-to-Five Year Lease Term
April/May Availability

Contact: Dick Nelson

CCA
Commonwealth Computer Advisers, Inc.
106 North Eighth Street
Richmond, Virginia 23219
(804) 643-9123

FINANCIAL

148's 138's

IBM 378

LEASES

168's 158's

AMDAHL

National Computer Rental, Ltd.
415 Madison Avenue
New York, New York 10017
Tel. No. (212)532-1500

Member of Tiger Leasing Group
Member Computer Lessors Assoc.

IMMEDIATE AVAILABILITY

TWO NEW DEC
MINI-COMPUTER SYSTEMS

PDP 11/35-JA Processor
DU 11-DA Synchronous Interface
DJ11-AA 16 Ch. Multiplexor
KT 11-D Memory Management
DD 11-B Control Box
QJ 620-AC Operating System
RSX-11M

ITC Available
Offers Only

Brokers Firm
(818) 558-0443

PERSONAL
MINICOMPUTER SYSTEMS

32K
CPU
2-CRT
TERMINALS
2-DISKS
(FLOPPY)

ABBOTT COMPUTER COMPANY
57 Gregory St.
Marblehead, MA 01945
(617) 631-8903

SOFTWARE FOR SALE

InSci
Information Science Incorporated
Others may claim conversion, training and installation but we really do it

ERISA
Every company with 500 employees or more should look at this system

InSci 95 Chestnut Ridge Road Montvale NJ 07645 201 391 1600

---

the choice of

Hertz®

ACCOUNTING IV
GENERAL LEDGER

Our software packages—General Ledger, Accounts Receivable, Accounts Payable and Standard Cost—are the choice of leaders like Hertz *not by chance, but by design.*

For details, call (201) 488•2100

Informatics Inc
Worlds Largest in Software Products
65 Route 4 River Edge N J 07661

software for sale

Personnel Management and Reporting

MSA'S Personnel Management and Reporting System keeps records on more people than live in Atlanta, San Diego, Boston and Los Angeles combined.

If you'd like to find out how this system can help you keep comprehensive personnel data in compliance with Federal Governmental EEO, ERISA and OSHA requirements, call Marge Kimbrough at (404) 262-2376 or send us this coupon.

MSA
THE FINANCIAL SOFTWARE COMPANY

Management Science America, Inc.
3445 Peachtree Road, N.E
Suite 1300
Atlanta, Georgia 30326
(404) 262-2376

Chicago 312-986-2450.
Los Angeles 213-822-9766.
New York 201-871-4700

NAME
COMPANY
TITLE
ADDRESS
CITY
STATE ZIP
PHONE COMPUTER MODEL

I am interested in
- ☐ Personnel Management and Reporting
- ☐ General Ledger
- ☐ ALLTAX™
- ☐ Accounts Payable
- ☐ Accounts Receivable
- ☐ Financial Information and Control
- ☐ Fixed Asset/Property Accounting
- ☐ Supplies Inventory Control and Purchasing

SAVE WASTED DISK...

VSERV, a VTOC Service Utility, solves disk management problems of identifying wasted disk space under DOS and DOS/VS. VSERV provides graphic mapping facilities and VTOC access capabilities. Powerful VTOC manipulation commands are supplied to graphically DISPLAY a VTOC, CREATE, DELETE, UPDATE, RENAME, or TRUNCATE one or more files. VSERV allows instant identification of free space, under blocked and over allocated files.

User tailored default and security options provide against unauthorized use of the VTOC manipulation commands. A complete audit trail for historical use is provided.

VSERV provides all of these capabilities for a one time purchase of $400. Join over 30 satisfied users on all types of direct access devices. Order VSERV today on a 30 day trial.

Occidental Computer Systems
10202 Riverside Drive
No. Hollywood, Calif. 61602
(213) 763-6144

TONE III

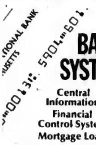
The only COMPLETE time sharing system for VSI
(check these points)

- Edit with full screen capability
- Internal reader job submit
- Output retrieval with remote support
- System maintenance
- Program development
- Data entry
- System debugging
- Text editing
- Performance monitoring support
- User command interface
- Interactive program execution
- Operations additional console support
- Dataset maintenance
- Catalog management
- Isp support
- Remote entry subsystem support
- Enhanced 3270 usability
- Full ASCII terminal support
- Interactive computing
- Data inquiry

(write for details)

TONE
Software Corp
(714) 636-8501
11588 Trask Avenue Garden Grove, Ca 92643

software for sale



BANK SYSTEMS

Central Information
Financial Control System
Mortgage Loan
Time Certificates of Deposit
Commercial Loan
Demand Deposit
Installment Loan
Savings

COMDAR
CORPORATION
892 Worcester St.
Wellesley Hills, Mass 02181
(617) 237-5585
Offices: Boston/Los Angeles

RPG II SYSTEMS

- *A/R-OPEN ITEM OR B/F
- *ACCOUNTS PAYABLE
- *GENERAL LEDGER
- *PAYROLL AND LABOR DIST.
- *INVENTORY
- *CREDIT UNION' MAILING, ETC

Extensive Documentation Provided

Bancroft Computer Systems
P.O. Box 1533, Dept. C
West Monroe, LA. 71291
(318) 388-2236

InSci

Information Science Incorporated

Personnel

Every company with 500 employees or more should look at this system

InSci 35 Chestnut Ridge Road Montvale NJ 07645

—CIMS—

Job accounting & system performance reporting product for IBM 370/360 computer users. CIMS supports all current releases and variations of DOS, DOS/VS, POWER/VS, OS/VS1, VS2, MVS, MFT, MVT, etc. The CIMS product is the only job accounting system to receive an award from Datapro for program excellence. To order a demonstration of CIMS without obligation, contact:

BMS Computer Inc.
P.O. Box 3066
Walnut Creek, CA 64696
(415) 638-2620

software for sale

GAMBLES DATAMATION INC.

WE WANT SOFTWARE

Gambles Datamation is one of the major data centers in the Los Angeles area. We have a large professional staff, as well as, our own marketing support group. We want to expand our service and client base by aggressively marketing and installing packaged software. We are looking for a few good packages that are user oriented and capable of running in a large IBM 370 OS, VS environment.

Interested parties may write to:
Gambles Datamation Inc.
Attention: Software
2709 North Ontario St.
Burbank, Calif. 91504

Retrieve Sales/Use Tax rates automatically with

SALESTAX

Many firms avoid costly tax assessments and save valuable staff time too, with **SALESTAX** the magnetic tape file of all Sales/Use Tax Rates. Updated monthly. For free brochure call or write

VERTEX SYSTEMS Inc.
an MAI company
1018 W. Eighth Avenue
King of Prussia, PA 19408
215-337-0500

System/3

General Ledger

- Financial data base
- Any chart of accounts
- Report Writer
- Allocations

Get MORE from your System/3

SOFTWARE® INTERNATIONAL
Elm Square, Andover, Mass 01810
(617) 475-5040
® Registered trademark of Software International Corp.

COBOL FOR NOVAS

- On Any Data General Computer
- With All DG Operating Systems
- Ansi Standard/Extensions
- Real-Time Payroll & General Ledger

IST DATASYSTEMS
2985 Vanguard Drive
Memphis, Tennessee 38131
(901) 332-3544

PAYROLL PERSONNEL

SUPER/PAY ONLY $960 ANS COBOL 60+ USERS

Users on IBM, Burroughs, Univac and minis such as NCR, DG, & Four Phase

Easy to Use 30 Day Trial

Occidental Computer Systems
10202 Riverside Drive
No. Hollywood, Calif. 61602
(213) 763-5144

software for sale

DO YOU SUPPLY SOFTWARE SERVICES
For IBM-System/3
System/32, Series/1
DEC PDP-11

The managing director of the leading United Kingdom specialist in small computer systems will be visiting the U.S. in April. He would like to meet company executives who are interested in creating trading links with the British and European market place and is particularly interested in software packages. Please write with full details.

W.A. Wells
WELLORAX LTD.
Westfield House
Hampton Court
East Molesey, Surrey
ENGLAND

TIME & SERVICES

I.B.M. 360-40

All Shifts 128K, 4-2401 MOD-2, 9-2314, 1403-N1, 2540, 1401 Compatibility.
From $35/Hour

Restaurant Associates, Inc.
1540 Broadway
New York, N.Y. 10036
Contact:
Al Palmo (212) 974-4966
Charles Leigey (212) 974-4967

Local & Remote Computing On

370/158

OS/VS1-JES1 and CICS
Very Attractive Rates
3330's, 3420's, 3211 and Microfiche
24 Hours — 7 Days
Network Computing Corp.
4027 Park Road
Charlotte, N.C. 28206
704-626-6610

TEXT DATA BASE BUILDING AT FANTASTIC RATES!

ComCom can presently input forty million characters per week. All material is double-keyed and electronically proofread. The maximum error rate is one in 20,000 keystrokes. Rates begin at $1.25 per thousand keystrokes. We also specialize in converting, updating and CRT typesetting of existing data bases.

For further information please call or write to Mr. David M. Zellner, ComCom, Inc., Data Base Services, 27 North 7th Street, Allentown, Pa 18101 215-437-9656

time & services

Datacenter 370/158

3 meg VS2
Specializing in Remote Job Entry and Batch
Excellent Technical Support
Very Attractive Rates
Contact: Stu Kerievsky
(212) 564-3030
Datamor
132 W. 31st St.
New York, N.Y. 10001

WE ARE BROKERS OF COMPUTER TIME

New York & New Jersey Only
COMPUTER RESERVES, INC.
(212) 687-1840 (201) 676-1881

DATA BINDERS $1.75 EACH

14 7/8 x 11 Pressboard
All Other Sizes Available
$35 Minimum
CENTURY (212) 221-3898

Computer Time Available

360-40-256K • 360-40-128K
360-40-128K • 360-30-128K

(18) 2401 180K.B.
(18) 2314 Disk Drives (8) 2311
(4) 1100 L.P.M. Printers

Babbage Systems, Inc.
345 Park Ave. N.Y.
Contact: Nancy Guberman
(212) 688-1111

IBM UNIT RECORD EQUIPMENT

024 077 085 402 514 552 026
082 087 403 519 557 029 083
088 407 523 602 056 084 089
408 548 604 029 129

We Buy Sell or Lease
360s 1400s 1440s

IBM COMPUTERS

2040 GF, I/O Set
5 Spindle Calcomp 2314
6-60KB Tape Drives/Sims
6-1440 Disc Systems at $4,000
16K 1460 Systems with 1403-3
2603-2 and 2401-6
1401 Disc Systems
360/30's & 40's
any configuration

Big Savings on certain items of Equipment

Call us for all your needs; we buy rent and sell all types of IBM unit record equipment. Over 12 years of serving commercial and government requirements. Contact ACS for proposal

ACS
7126 Mullins
Houston TX 77036
(713) 666-2122
TWX 910-881-1526
EQUIPMENT CORP.

Whether you're buying, selling, swapping, hiring or looking, Computerworld's Classifieds work.

Issue Date: Ad closing is every Friday, 10 days prior to issue date.

Sections: Please be sure to specify the section you want: Time and Services, Software for Sale, Position Announcements and Buy/Sell/Swap. (Available upon request: Software Wanted, Turnkey Systems and Real Estate.)

Copy: We'll typeset your ad at no extra charge. Please attach CLEAN typewritten copy.

Cost: Our rates are $49.70 per column inch. Minimum size is two column inches and costs $99.40 per insertion. Extra space is available in half-inch increments and costs $24.85. Box numbers are $1.00 extra.

Billing: If you're a first-time advertiser, we must have your payment in advance.

Ad Size: ______ Issue (Date(s): ______ Section: ______

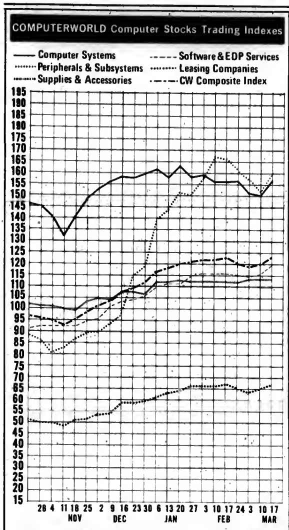
Signature ______

Name: ______

Company: ______ Title: ______

Address: ______ Tel: ______

Send this form to: Frank Collins, Classified Advertising,
or Kathy Steinberg, Position Announcements
COMPUTERWORLD, 797 Washington St., Newton, Mass. 02160


COMPUTERWORLD Computer Stocks Trading Indexes

Earnings Reports

DIGITAL EQUIPMENT
Three Months Ended Jan. 1

	1977	1976
Shr Ernd	$.56	a$.45
Revenue	241,000,000	172,601,000
Earnings	22,696,000	16,274,000
6 Mo Shr	1.01	a.77
Revenue	445,542,000	313,059,000
Earnings	39,401,000	27,064,000

a-Adjusted for November 1976 three-for-one stock split.

ELECTRONIC ARRAYS
Three Months Ended Dec. 31

	1976	1975
Shr Ernd	.....	$.01
Revenue	$3,668,000	4,220,000
Tax Cred	.....	5,000
Earnings	(1,297,000)	16,000
6 Mo Shr	.....	.44
Revenue	12,266,000	11,764,000
Tax Cred	.....	80,000
Earnings	(2,636,000)	252,000

INTERSIL
Three Months Ended Dec. 26

	a1976	1975
Shr Ernd	$.30	$.12
Revenue	20,261,000	17,095,000
Tax Cred	777,000	304,000
Earnings	1,616,000	616,000

a-Results reflect merger between Intersil and Advanced Memory Systems.

NCR
Year Ended Dec. 31

	1976 (000)	1975 (000)
Shr Ernd	$3.60	$2.90
Revenue	2,312,713	2,165,607
Earnings	95,644	72,491
3 Mo Shr	1.41	.68
Revenue	715,840	848,629
Earnings	38,860	17,295

PLESSEY
Three Months Ended Dec. 31

	1976	1975
Shr Ernd	$.41	$.36
Revenue	242,800,000	213,600,000
Earnings	9,600,000	6,700,000
9 Mo Shr	1.12	1.14
Revenue	701,200,000	590,000,000
Earnings	26,300,000	21,300,000

Computerworld Sales Offices

Vice-President/Marketing
Roy Einreinhofer
Advertising Administrator
Judy Milford
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA-92-2529

Boston
Robert Ziegel
Northern Regional Manager
Mike Burman
Account Manager
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

New York
Donald E. Fagan
Eastern Regional Manager
Frank Gallo
Account Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

San Francisco
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Donna Dezelan
Account Coordinator
COMPUTERWORLD
1212 Hearst Bldg
San Francisco, Calif. 94103
Phone: (415) 495-0990

Los Angeles
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Chris Canary
Account Coordinator
1434 Westwood Boulevard
Los Angeles, CA 90024
(213) 475-8486

Japan:
Mr. Shigema Takahashi
General Manager
Dempa/Computerworld
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Phone: (03) 445-6101
Telex: Japan-26792

United Kingdom:
Roger R. Frampton
Computerworld Publishing Ltd.
140-146 Camden Street
London NW1 9PF, England
Phone: (01) 485-2248
Telex: UK-26-47-37

West Germany:
Manfred Kufner
Computerworld GmbH
8000 Munich 40
Tristanstrasse 11
West Germany
Phone: (089) 36 40 36
Telex: W Ger-5-215250-HKFO

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 16, 1977

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1976-77 RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	23- 40	28	0	0.0
N	BURROUGHS CORP	66-108	69 3/8	+3 3/8	+5.1
O	COMPUTER AUTOMATION	10- 25	25 1/8	+2 3/4	+12.2
N	CONTROL DATA CORP	18- 27	22 3/4	+ 1/4	+1.1
N	DATA GENERAL CORP	40- 60	45 3/8	+3 5/8	+8.6
O	DATAPOINT CORP	23- 46	24	+2 3/4	+12.9
N	DIGITAL EQUIPMENT	41- 60	45 1/4	+4	+9.6
N	ELECTRONIC ASSOC.	2- 5	2 3/8	+ 1/8	+5.5
A	ELECTRONIC ENGINEER.	7- 16	8 1/8	+ 1/4	+3.1
O	FOUR-PHASE SYSTEMS	13- 21	14 3/4	+ 3/8	+2.6
N	FOXBORO	28- 51	48 1/2	+1 3/4	+3.7
O	GENERAL AUTOMATION	4- 11	7 1/8	+ 1/8	+1.7
O	GRI COMPUTER CORP	1- 1	5/8	+ 1/8	+25.0
N	HEWLETT-PACKARD CO	69-117	75 3/4	+4 1/4	+5.9
N	HONEYWELL INC	34- 56	49 1/8	+1 1/8	+2.3
N	IBM	227-288	284	+4 3/8	+1.5
O	MANAGEMENT ASSIST	1- 9	7 1/8	- 5/8	-8.0
O	MEMOREX	17- 33	28	+2 1/8	+8.2
O	MICRODATA CORP	7- 28	8	-1 1/4	-13.5
O	MODULAR COMPUTER SYS	3- 14	5 3/4	+ 3/8	+6.9
N	NCR	24- 38	37 1/8	+2 3/4	+8.0
O	PRIME COMPUTER INC	4- 18	14 1/8	- 7/8	-5.8
N	PERKIN-ELMER	18- 27	18 1/4	+ 1/2	+2.8
N	RAYTHEON CO	45- 67	56 3/8	+1 3/8	+2.5
N	SPERRY RAND	28- 52	38 1/8	+ 5/8	+1.6
O	SYCOR INC	9- 31	11 3/8	+ 3/4	+7.0
A	SYSTEMS ENG. LABS	5- 13	6 1/4	+ 1/8	+2.0
N	VARIAN ASSOCIATES	12- 19	17 7/8	+ 7/8	+5.1
A	WANG LABS.	11- 23	17 1/2	+ 3/8	+2.1

LEASING COMPANIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COMPUTER CORP	1- 9	8 3/8	- 1/8	-1.3
O	COMDISCO INC	3- 13	10 3/4	0	0.0
A	COMMERCE GROUP CORP	2- 3	1 7/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 3	1 3/8	+ 1/4	+22.2
M	DATRONIC RENTAL	1- 3	1 1/4	0	0.0
A	DCL INC	1- 2	1 1/2	0	0.0
N	DPF INC	5- 8	7 3/8	+ 3/8	+5.3
N	ITEL	6- 16	14 1/2	+ 3/4	+5.4
N	LEASCO CORP	6- 22	19	0	0.0
O	LEASPAC CORP	0- 1	1	+ 1/4	+33.3
O	NPG INC	0- 1	1/4	0	0.0
A	PIONEER TEX CORP	6- 11	8 5/8	- 1/8	-1.4
N	U.S. LEASING	7- 12	10 7/8	+1	+10.1

EXCH: N=NEW YORK; A=AMERICAN; B=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1 3/8	0	0.0
O	ANACOMP INC	6- 11	8 1/4	- 1/8	-1.4
A	APPLIED DATA RES.	2- 7	5 3/4	- 1/8	-2.1
N	AUTOMATIC DATA PROC	17- 35	25 1/4	+1 5/8	+6.8
O	COLEMAN AMERICAN COS	2- 6	2	- 1/8	-5.8
O	COMPU-SERV NETWORK	3- 15	14	+ 1/4	+1.8
O	COMP ELECTION SYSTMS	5- 9	7 1/2	+ 3/4	+11.1
O	COMPUTER HORIZONS	1- 2	1 1/4	0	0.0
O	COMPUTER NETWORK	2- 8	6 5/8	+ 1/4	+3.9
N	COMPUTER SCIENCES	4- 9	7 7/8	+ 1/4	+3.2
O	COMPUTER TASK GROUP	1- 2	1 1/4	0	0.0
O	COMPUTER USAGE	2- 6	2 3/8	- 1/8	-5.0
O	COMSHARE	2- 5	5 1/2	0	0.0
O	DATA DIMENSIONS INC	2- 5	4 5/8	0	0.0
O	DATATAB	1- 2	2 1/4	+ 3/8	+20.0
N	ELECTRONIC DATA SYS.	12- 19	16 1/8	- 1/8	-0.7
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORP	1- 3	2	0	0.0
O	IPS COMPUTER MARKET.	1- 2	3/4	0	0.0
O	KEANE ASSOCIATES	2- 4	2 7/8	- 1/8	-4.1
O	KEYDATA CORP	1- 5	2 5/8	0	0.0
A	LOGICON	3- 14	13 7/8	+2 3/8	+20.6
A	MANAGEMENT DATA	1- 3	1 3/8	0	0.0
A	NATIONAL CSS INC	13- 25	20 3/8	+ 3/8	+1.8
O	NATIONAL DATA CORP	4- 7	5 1/2	- 1/8	-2.2
A	ON LINE SYSTEMS INC	17- 23	19 3/4	0	0.0
N	PLANNING RESEARCH	3- 5	3 3/4	0	0.0
O	PROGRAMMING & SYS	1- 1	5/8	+ 1/8	+25.0
O	RAPIDATA INC	2- 5	1 7/8	- 1/8	-6.2
O	REYNOLDS & REYNOLDS	13- 21	17 1/4	- 1/4	-1.4
O	SCIENTIFIC COMPUTERS	1- 2	2	0	0.0
O	TYMSHARE INC	14- 28	17 1/4	+1	+6.1
A	UPS SYSTEMS	3- 5	4	0	0.0
N	WYLY CORP	1- 7	1 5/8	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1976-77 RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 14	12 1/2	+1 1/8	+9.8
O	ADVANCED MEMORY SYS	4- 10	7 3/8	+ 3/8	+5.3
N	AMPEX CORP	5- 10	8 3/4	+ 7/8	+11.1
O	ANDERSON JACOBSON	2- 4	3 7/8	+ 1/8	+3.3
O	APPLIED DIG DATA SYS	10- 25	12 1/8	+1 1/8	+10.2
O	BEEHIVE MEDICAL ELEC	3- 12	10 1/2	+ 1/2	+5.0
A	BOLT,BERANEK & NEW	7- 11	7 1/4	- 3/8	-4.9
N	BUNKER-RAMO	8- 12	11 3/8	- 1/4	-2.1
A	CALCOMP	3- 7	3 1/4	0	0.0
O	CAMBRIDGE MEMORIES	0- 6	1 3/8	+ 3/8	+35.2
N	CENTRONICS DATA COMP	20- 36	24	+ 1/8	+0.5
O	CODEX CORP	22- 47	46 1/4	+2 1/2	+5.7
O	COGNITRONICS	1- 1	1	0	0.0
O	COMPUTER COMMUN.	1- 6	5 1/2	- 3/8	-6.3
O	COMPUTER CONSOLES	4- 7	4	0	0.0
A	COMPUTER EQUIPMENT	1- 3	2 1/4	+ 1/8	+5.8
O	COMPUTER TRANSCEIVER	1- 3	1 1/4	+ 1/8	+11.1
O	COMTEN	4- 13	12 1/4	+1	+8.8
N	CONRAC CORP	20- 27	24 7/8	+ 1/2	+2.0
O	DATA ACCESS SYSTEMS	1- 5	5 1/2	+ 1/4	+4.7
O	DATA 100	6- 13	7 7/8	+ 1/8	+1.6
A	DATA PRODUCTS CORP	5- 15	11 3/8	+ 5/8	+5.8
O	DATA TECHNOLOGY	1- 3	2 7/8	0	0.0
O	DATUM INC	1- 2	1 1/2	+ 1/8	+9.0
O	DECISION DATA COMPUT	1- 4	2	- 1/8	-5.8
O	DELTA DATA SYSTEMS	1- 1	1/2	0	0.0
N	ELECTRONIC M & M	1- 4	4 1/4	+ 3/8	+9.6
O	FABRI-TEK	1- 2	1 3/8	+ 1/8	+15.0
O	GENERAL COMPUTER SYS	0- 2	3/8	- 1/8	-25.0
N	HAZELTINE CORP	4- 12	10 5/8	+ 1/4	+2.4
N	HARRIS CORP	27- 35	34 1/8	+1 3/4	+5.4
A	INCOTERM CORP	9- 20	13 3/4	+ 3/8	+2.8
O	INFOREX INC	3- 7	5 5/8	0	0.0
O	INFORMATION INTL INC	10- 18	11 7/8	+ 1/2	+4.3
O	INTEL CORP	47-109	91	-4 1/2	-8.1
A	LUNDY ELECTRONICS	3- 7	3 3/8	- 1/8	-3.5
O	MSI DATA CORP	3- 8	7 1/2	+ 1/8	+1.6
N	MILGO ELECTRONICS	15- 37	37 1/8	0	0.0
N	MOHAWK DATA SCI	3- 13	6	- 1/4	-4.0
O	PENRIL CORP	1- 3	3 3/4	- 1/4	-6.2
A	PERTEC CORP	3- 9	7 1/8	+ 3/8	+5.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 10	2	0	0.0
O	QUANTOR CORP	4- 6	4 3/4	0	0.0
O	RECOGNITION EQUIP	6- 11	9 1/8	+ 1/2	+6.5
O	SCAN DATA	1- 4	1 3/8	0	0.0
O	STORAGE TECHNOLOGY	9- 13	10 3/4	- 1/4	-2.2
O	T BAR INC	5- 13	9 1/2	+1 5/8	+20.6
O	TALLY CORP.	4- 6	5 1/4	+ 1/4	+5.0
O	TEC INC	3- 9	7 3/4	+ 1/4	+3.3
N	TEKTRONIX INC	45- 69	59 3/4	+2 1/8	+3.6
N	TELEX	2- 5	2 5/8	- 1/4	-8.6
O	WILTEK INC	1- 2	1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1976-77 RANGE (1)	CLOSE MAR 16 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	3- 5	2 3/4	- 1/8	-4.3
A	BARRY WRIGHT	6- 12	11 1/2	+1	+9.5
O	CYBERMATICS INC	0- 1	1/2	- 1/8	-20.0
O	DUPLEX PRODUCTS INC	13- 24	17 3/8	0	0.0
A	ENNIS BUS. FORMS	6- 8	6	- 1/4	-4.0
O	GRAHAM MAGNETICS	8- 14	12 1/2	0	0.0
O	GRAPHIC CONTROLS	13- 19	14 3/4	0	0.0
N	3M COMPANY	48- 66	53 7/8	+2 7/8	+5.6
O	MOORE CORP LTD	31- 51	32 1/4	+1	+3.1
N	NASHUA CORP	11- 23	18	0	0.0
O	STANDARD REGISTER	15- 21	20 1/4	+ 1/4	+1.2
O	TAB PRODUCTS CO	5- 17	16 3/4	+ 1/4	+1.5
N	UARCO	19- 25	20 3/4	- 1/4	-1.1
A	WABASH MAGNETICS	4- 14	11 3/4	+ 1/8	+1.0
N	WALLACE BUS FORMS	19- 25	18 3/4	+ 3/4	+3.9

The Missing Link

The HP 3000 Series II closes the gap between the small business system and the big central computer.

Until recently, that gap was a real problem. For small to medium-sized companies the cost of a big computer was prohibitive. But there was a growing need for extensive batch processing and real-time information management.

Today, the HP 3000 Series II fills that need. A fast, powerful general purpose system, it can handle a wide variety of computing modes at the same time. Yet system prices start as low as $110,000 (U.S. domestic price).

A versatile operating system is the key.

Our Multiprogramming Executive allows the system's resources to be used concurrently. While batch jobs are running, several users can interact with the computer on a time-share basis via terminals (either hard-wired or over phone lines).

Operating speed is maximized with firmware-assisted software. And spooling, standard on all models, keeps the peripherals working at top speed.

Our system has virtual memory, giving you the flexibility to run large programs with a relatively small real memory. And with batch plus terminal capability, you can develop programs at a terminal using our interactive EDITOR—then run them unchanged in batch mode for production work.

The HP 3000 is fluent in COBOL, RPG, FORTRAN, BASIC, APL and SPL (our ALGOL-like Systems Programming Language). These are high-level languages, which the operating system treats alike. The same simple control language statements let you use any programming language.

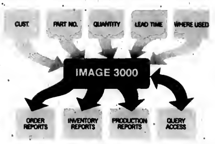
Data Base Management: another "big computer" advantage.

IMAGE/3000, our DBM software package for this system, gives you the means to create and manage a data base. And our simple English-like inquiry language, QUERY, lets you access your data base easily.

You can compile reports, make casual inquiries without writing programs and update data on-line. You can generate forms, titles, page and column headings, data sorted by categories, subtotals, totals and averages.

IMAGE has proved to be such a useful DBM capability that it was named to the 1976 Datapro Software Honor Roll. This places it among the 38 top software products, and one of only three DBM packages, among 1447 rated by computer system users throughout the country.

The software was judged in six categories: ease of installation, throughput efficiency, vendor support, ease of use, documentation and overall satisfaction.



Turning raw numbers into usable information. *All the tools for data base management are provided by our IMAGE/3000 software package and English-like QUERY inquiry language.*

We've made our data management capability even more useful with the addition of KSAM (Keyed Sequential Access Method), giving you fast access to indexed sequential files.

Hardware advances add speed and reliability.

HP's "fault control memory" keeps the CPU running at full speed, even when a memory circuit has failed. Five error-correcting bits in every 21-bit word determine where a fault has occurred and the system compensates for it. A RAM automatically stores the information about the faulty chips. When our Customer Engineer arrives for regular maintenance, he calls up a status report and replaces any faulty circuits—even though everything has been running fine as far as you're concerned.

Fast (350 ns access) semiconductor memory is used, making the CPU easy to expand. In fact, you can go from 128K bytes of mainframe memory to 512K bytes, depending on the system you choose. And disc capacity ranges from 15 to 400 megabytes.

At the heart of the CPU is a 32-bit bipolar ROM-based microprocessor. It contains 209 firmware instructions that execute many system operations normally left to software. This microprogramming speeds up such recurring operations as moving character strings from one location to another, scanning strings for a particular character and environment switching. Processing interrupts and linked list searches are also implemented in microcode, relieving the operating software of considerable overhead burden.

With its power and versatility, the HP 3000 is a natural upgrade for companies outgrowing their small business computers. If you'd like to see it in action, call your nearest Hewlett-Packard office listed in the White Pages. Or write to Bill Krause, Hewlett-Packard, 11000 Wolfe Road, Cupertino CA 95014.

Handling big business problems on a small computer.

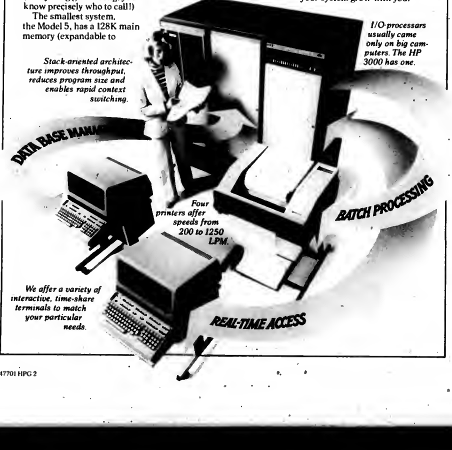
With a throughput two to six times greater than the original HP 3000, the Series II is designed to handle batch operations and multi-terminal on-line computation simultaneously.

All components of the system are supplied by Hewlett-Packard, which assures maximum compatibility and minimum service problems. (If anything goes wrong, you know precisely who to call!)

The smallest system, the Model 5, has a 128K main memory (expandable to 256K), plus a 15 megabyte moving-head disc, a 1600-bpi magnetic tape unit, an HP 2640B CRT terminal and a 16-port asynchronous terminal controller.

The Model 7 takes you to 192K bytes of main memory (expandable to 256K), with two 47 megabyte discs, IMAGE data base management, COBOL and RPG. The Model 9 has 320K bytes of main memory (expandable to 512K). IMAGE and five programming languages are standard.

Any configuration can be enhanced with the addition of line printers, card readers and punches, terminals, discs, tapes and more main memory. Everything is planned to let your system grow with you.



I/O processors usually came only on big computers. The HP 3000 has one.

Stack-oriented architecture improves throughput, reduces program size and enables rapid context switching.

Four printers offer speeds from 200 to 1250 LPM.

We offer a variety of interactive, time-share terminals to match your particular needs.

HEWLETT hp PACKARD

47701 HPG 2